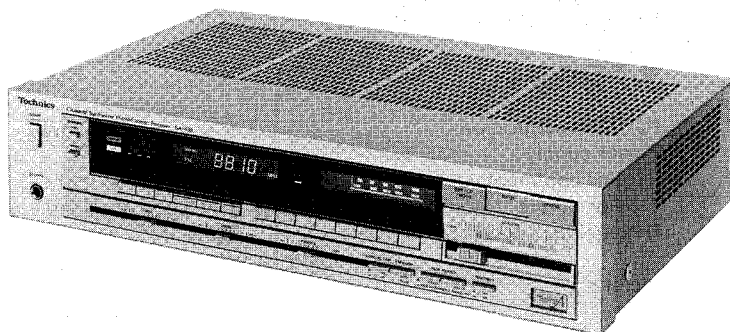


Service Manual

QUARTZ Synthesizer FM/AM Stereo Receiver



SA-410

[EX], [EH]

SA-410(K)

[EX], [EH]

*The colors of this model include silver and black.
*The black type model is provided with (K) in the Service Manual.

Areas

* [EX] is available in Switzerland and Scandinavia.
* [EH] is available in Holland.

Specifications (Specifications are subject to change without notice for further improvement.)

■ AMPLIFIER SECTION

DIN power output	2 × 70W (4Ω) 2 × 53W (8Ω)
1 kHz continuous power output both channels driven	2 × 60W (4Ω) 2 × 48W (8Ω)
20 Hz~20 kHz continuous power output both channels driven	2 × 50W (4Ω) 2 × 45W (8Ω)
Total harmonic distortion rated power at 1 kHz	0.007% (4Ω) 0.007% (8Ω)
half power at 20 Hz~20 kHz	0.015% (4Ω) 0.007% (8Ω)
half power at 1 kHz	0.001% (8Ω)
Intermodulation distortion	
rated power at 250 Hz: 8 kHz=4:1, 4Ω	0.015%
rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0.01%
Power bandwidth	
both channels driven, -3 dB (T.H.D. 0.04%)	5 Hz~40 kHz (4Ω) 20 (4Ω), 40 (8Ω)
Damping factor	20 (4Ω), 40 (8Ω)
PHONO maximum input voltage (1 kHz, RMS)	160 mV
S/N	
rated power (4Ω)	
PHONO	75 dB (IHF, A: 80 dB)
AUX/CD/VIDEO	88 dB (IHF, A: 95 dB)
TAPE 1, TAPE 2/EXT	88 dB (IHF, A: 95 dB)
-26 dB power (4Ω)	
PHONO	63 dB
AUX/CD/VIDEO	64 dB
TAPE 1, TAPE 2/EXT	64 dB
50 mW power (4Ω)	
PHONO	60 dB
AUX/CD/VIDEO	60 dB
TAPE 1, TAPE 2/EXT	60 dB

Input sensitivity and impedance

PHONO	2.5 mV/47kΩ
AUX/CD/VIDEO	150 mV/22kΩ
TAPE 1, TAPE 2/EXT	150 mV/22kΩ

Frequency response

PHONO	RIAA standard curve ±0.8 dB (30 Hz~15 kHz)
AUX/CD/VIDEO	5 Hz~70 kHz (-3 dB)
TAPE 1, TAPE 2/EXT	5 Hz~70 kHz (-3 dB)

Tone controls

BASS	50 Hz, +10 dB~-10 dB
TREBLE	20 kHz, +10 dB~-10 dB

Subsonic filter

Loudness control (volume at -30 dB)	30 Hz, -6 dB/oct. 50 Hz, +9 dB
-------------------------------------	-----------------------------------

Output voltage

TAPE 1, 2 REC OUT	150 mV
-------------------	--------

Channel balance, AUX/CD/VIDEO, TAPE 1,

TAPE 2/EXT 250 Hz~6,300 Hz	±1 dB
----------------------------	-------

Channel separation, AUX/CD/VIDEO, TAPE 1,

TAPE 2/EXT 1 kHz	55 dB
------------------	-------

Headphones output level and impedance

	450 mV/330Ω
--	-------------

Load impedance

MAIN or REMOTE	4Ω~16Ω
MAIN and REMOTE	8Ω~16Ω

■ FM TUNER SECTION

Frequency range	87.50~108.00 MHz
-----------------	------------------

Sensitivity

S/N 30 dB	1.9 μV (300Ω), 1.3 μV (75Ω)
S/N 26 dB	1.7 μV (300Ω), 1.2 μV (75Ω)
S/N 20 dB	1.5 μV (300Ω), 0.9 μV (75Ω)

IHF usable sensitivity

	1.9 μV (IHF '58)
--	------------------

IHF 46 dB stereo quieting sensitivity

	22 μV/75Ω
--	-----------

Total harmonic distortion

MONO	0.08%
STEREO	0.15%

S/N

MONO	60 dB (78 dB, IHF)
STEREO	58 dB (72 dB, IHF)

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Frequency response	20 Hz~15 kHz, +1 dB~-2 dB
Alternate channel selectivity	±400 kHz, 70 dB
Capture ratio	1 dB
Image rejection at 98 MHz	55 dB
IF rejection at 98 MHz	75 dB
Spurious response rejection at 98 MHz	82 dB
AM suppression	55 dB
Stereo separation	
1 kHz	40 dB
10 kHz	30 dB
Carrier leak	
19 kHz	-33 dB (-35 dB, IHF)
38 kHz	-50 dB (-50 dB, IHF)
Channel balance (250 Hz~6,300 Hz)	±1.5 dB
Limiting point	1.2 μ V
Bandwidth	
IF amplifier	180 kHz
FM demodulator	1000 kHz
Antenna terminals	300 Ω (balanced) 75 Ω (unbalanced)

■ AM TUNER SECTION

Frequency range	522~1611 kHz
Sensitivity (S/N 20 dB)	20 μ V, 300 μ V/m
Selectivity	55 dB
Image rejection at 999 kHz	40 dB
IF rejection at 999 kHz	60 dB

■ GENERAL

Power consumption	420W
Power supply	
For continental Europe	AC 50 Hz/60 Hz, 220V
For others	AC 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (W×H×D)	430 × 97 × 283 mm (16-15/16" × 3-13/16" × 11-5/32")
Weight	7.3 kg (16.1 lb.)

Note:

Total harmonic distortion is measured by the digital spectrum analyzer (H.P. 3045 system).

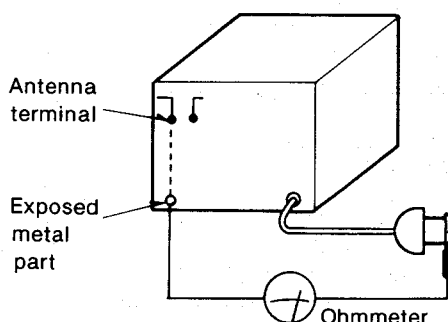
■ SAFETY PRECAUTION

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

● INSULATION RESISTANCE TEST

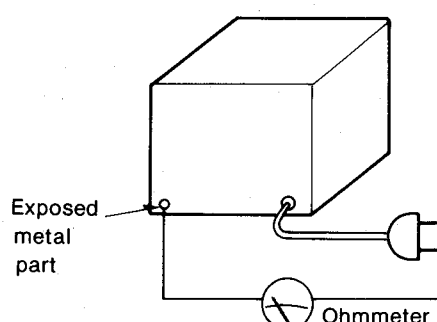
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between 3M Ω and 5.2M Ω to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



(Fig. A)

Resistance = 3M Ω —5.2M Ω



(Fig. B)

Resistance = Approx ∞

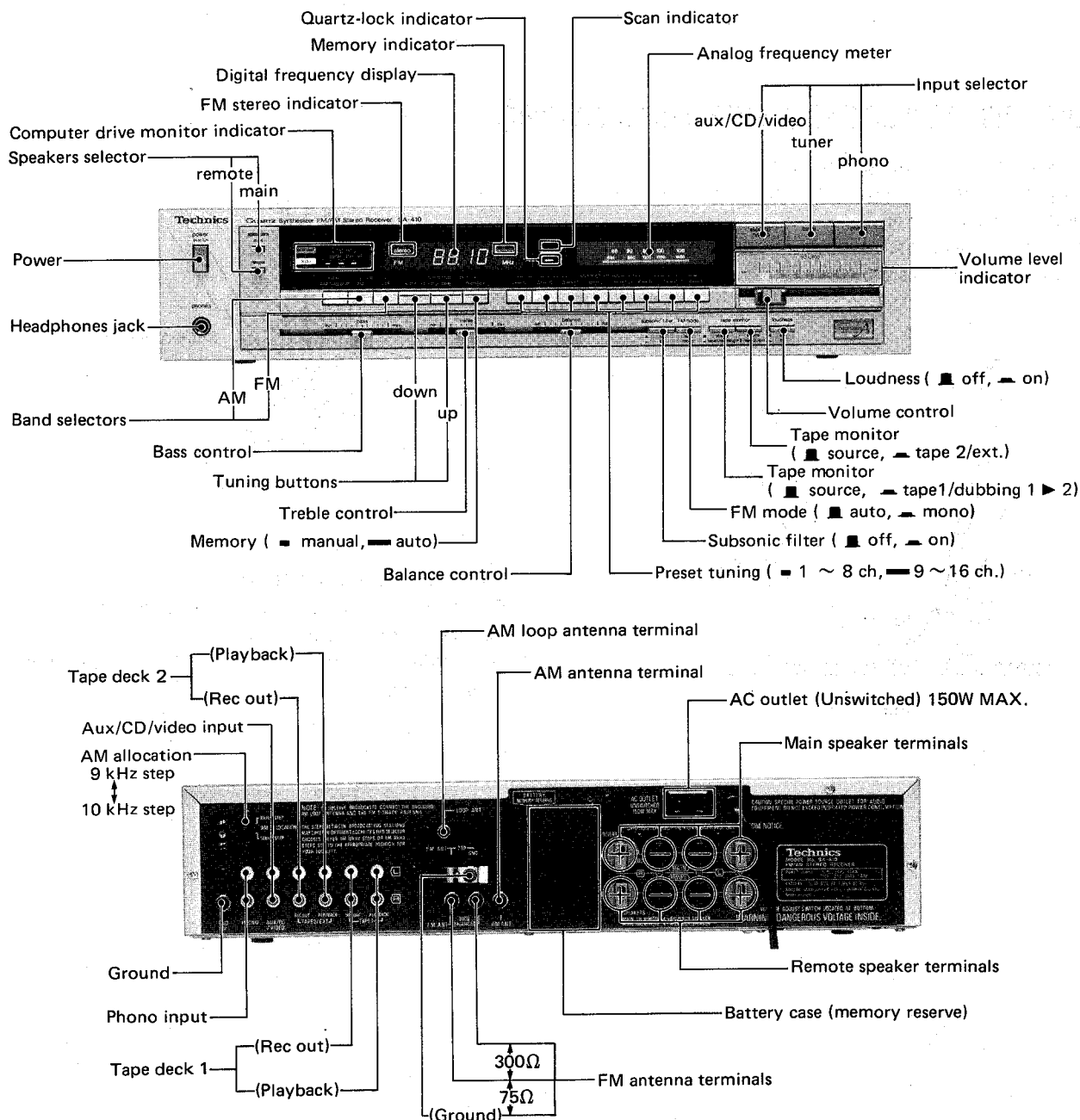
4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

CONTENTS

	Page
LOCATION OF CONTROLS	3
PROTECTION CIRCUITRY	4
BEFORE REPAIR AND ADJUSTMENT	4
HOW TO REPLACE CHIPS (RESISTORS)	4
HOW TO OPERATE	5
HOW TO USE THE AM LOOP ANTENNA	5 ~ 7
DISASSEMBLY INSTRUCTIONS	8 ~ 11
REPLACEMENT PARTS LIST (Electrical Parts)	11
ADJUSTMENT POINTS	12
MEASUREMENTS AND ADJUSTMENTS	12 ~ 14
TECHNICAL INFORMATION	15 ~ 16
SCHEMATIC DIAGRAM ①	
Tuner (FM/AM) circuit.	20 ~ 22
SCHEMATIC DIAGRAM ②	
Equalizer/Voltage amp./Tone amp./	
Ica controller/Power amp. circuit.	23 ~ 25

	Page
BLOCK DIAGRAM	
Tuner (FM/AM) circuit.	26 ~ 28
Equalizer/Voltage amp./Tone amp./	
Ica controller/Power amp. circuit.	29 ~ 30
TERMINAL OPERATION OF	
PLL CONTROLLER (IC901)	26 ~ 28
TERMINAL GUIDE OF TRANSISTORS,	
DIODES AND IC's	31
RESISTORS & CAPACITORS	32, 39
CIRCUIT BOARDS AND WIRING	
CONNECTION DIAGRAM	33 ~ 34
PRINTED CIRCUIT BOARDS	35 ~ 38
REPLACEMENT PARTS LIST	
(Cabinet and Chassis Parts)	40
EXPLODED VIEWS	41 ~ 42

LOCATION OF CONTROLS



*Phono input capacitance is about 150pF.

■ PROTECTION CIRCUITRY

The protection circuitry may have operated if either of the following conditions is noticed:

- No sound is heard when the power is turned on.
- Sound stops during a performance.

The function of this circuitry is to prevent circuitry damage if, for example, the positive and negative speaker connection wires are "shorted", or if speaker systems with an impedance less than the indicated rated impedance of this unit are used.

If this occurs, follow the procedure outlines below:

1. Turn off the power.
2. Determine the cause of the problem and correct it.
3. Turn on the power once again after one minute.

When the protection circuitry functions, the unit will not operate unless the power is first turned off and then on again.

■ HOW TO REPLACE CHIPS (RESISTORS)

1. Unsolder from chip by using solder sucker.
2. Remove chip with tweezers by rotating it while removing solder as shown in Fig. 1.
3. Solder circuit board first and then solder chip in the direction of the arrow as shown in Fig. 2.

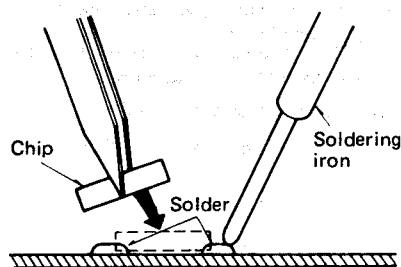


Fig. 2

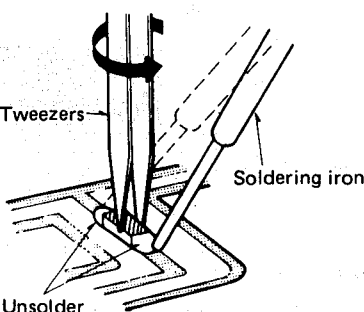


Fig. 1

■ BEFORE REPAIR AND ADJUSTMENT

1. Turn off the power supply and short-circuit both ends of power supply capacitors (C703, C704, 8200 μ F) with a resistor (about 10 Ω , 5W) to discharge the charged voltage.

Do not short both ends of C703 and C704 with a screwdriver. It may damage the component.

2. Before turning on the power supply after completion of repair, slowly apply the primary voltage by using a power supply voltage controller to make sure that the consumed current at 220V, 50 Hz in no-signal mode is 80 ~ 230mA. (60 Hz — 70 ~ 220 mA)

● Note for replacing chips

1. Do not heat chips more than three (3) seconds.
2. Be careful not to damage the electrode of chips.
3. Use soldering iron (less than 60W) and tweezers for replacing chips.

■ HOW TO OPERATE

● Preset radio broadcast frequencies

This unit can be used to preset as many as 16 radio broadcast frequencies: FM/AM random presetting. After broadcast frequencies have been preset as described below, any desired station can be quickly and easily selected by simply touching one button.

■ Memory presetting

There are two types of memory presetting: automatic and manual. Select whichever is preferred.

1. Automatic presetting:

Beginning at the frequency indicated by the digital display, the FM broadcasting stations and AM broadcasting stations will be automatically preset to "channels" 1 through 8 for FM and 9 through 16 for AM, respectively.

Important!



If this antenna is not installed, AM broadcasts will not be received.

Note that in mountainous or remote areas, broadcasting stations which have weak broadcasting signals cannot be automatically preset into the memory.

2. Manual presetting:

Stations can be freely preset to any desired channel.

Before memory presetting

Each button is used to preset two stations.

Front channels
Presetting front
channels (CH 1~8)

Back channels
Presetting back
channels (CH 9~16)



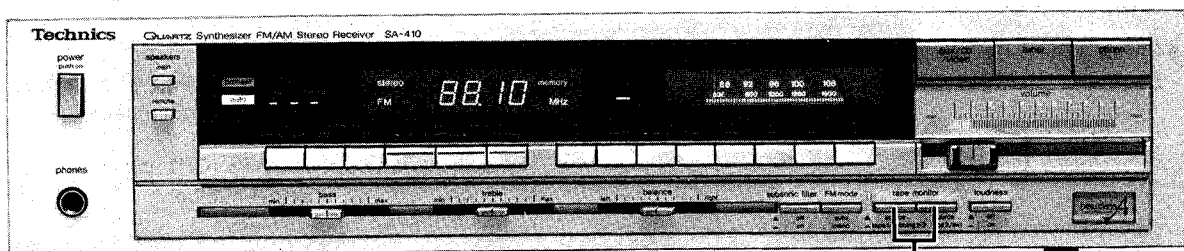
Press momentarily.



Press slightly longer.

● Tape recording

The level of the disc or radio broadcast signal emitted from the recording output terminals ("REC OUT") on the rear panel is always at a constant level, unaffected by the settings of other controls and switches.



① "source" ()

② Select the sound source for recording

③ Begin the disc play or tune to the radio broadcast.

④ Operation of tape deck

By using the controls on the tape deck, make the adjustment of the recording level. Then begin recording.

• Automatic memory presetting

3 Power: "on" ()

- 4 • To preset an FM station: press the "FM" button.
• To preset an AM station: press the "AM" button.

- 5 • To preset FM broadcasting stations: Set to 87.50 MHz.
• To preset AM broadcasting stations: Set to 522 kHz.

① Press the button and hold slightly

② Release it at 87.50 MHz for FM or 522 kHz for AM, and then press the button again momentarily

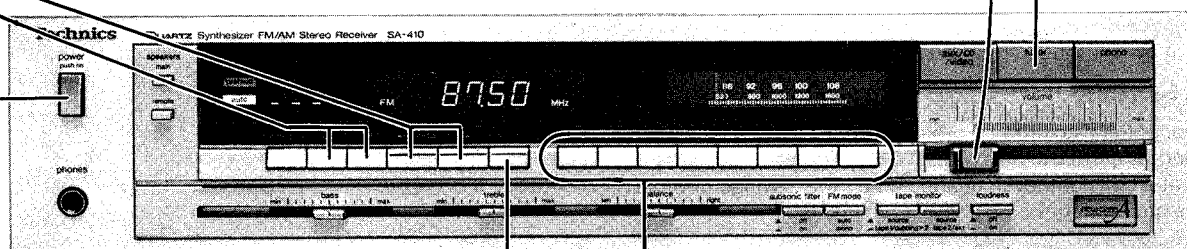
③ Press the button momentarily (frequency will change each time the button is pressed), and tune to one of the above frequencies.



(frequency will change continuously).



(frequency change will stop).



6 Press. When the frequency indication begins to change, release.



(The frequency will change upward, and the automatic presetting will begin with the broadcasting station of the lowest frequency and will continue in order.)

Notes:

- In areas where there are less than 8 FM stations, the remaining channels (through channel 8) will be left empty. The empty channels can be filled by using manual memory presetting.
- If a new broadcasting station is preset into a channel, the broadcasting station which was previously entered in that channel will be automatically erased.

1 "0 → 1"

Set volume control to low position for easier tuning.

2 "tuner" ()

7 Confirm the names (call signs, etc.) of the broadcasting stations which are preset to each channel, and enter them on the file sheet.

To check the front channels (CH1~8):

Press momentarily. Channel number is displayed. Frequency stored in the memory is displayed.



FM CH. 1 → 88.10 MHz

To check the back channels (CH 9~16):

Press slightly longer. Release the button when the channel number is displayed. Frequency stored in the memory is displayed.



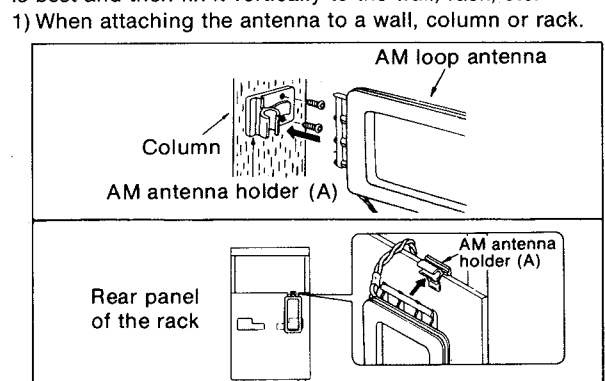
AM CH. 9 → 720 kHz

■ HOW TO USE THE AM LOOP ANTENNA

Pay attention to the following points when attaching the antenna.

- Do not attach it horizontally (to do so would impair reception).
- Do not attach it close to metal surfaces (to do so would result in noise).
- Do not attach it close to power cords, speaker wires, etc. (to do so would result in noise).
- Do not attach it close to a tape deck (when the tape deck is being used, chirping or beeping sounds may be received).

- Find the height and direction of the antenna where reception is best and then fix it vertically to the wall, rack, etc.



- Connect the AM loop antenna to the AM antenna terminals located on the rear panel of the unit.

• Manual memory presetting

3 Power: "on" ()

4 To preset an FM station: press the "FM" button.
To preset an AM station: press the "AM" button.

5 Press the appropriate tuning button to tune to the desired broadcast.

• Auto tuning

Press the button. When the frequency indication begins to change, release the button (a broadcasting station will be selected automatically). Repeat this operation until the desired station is found.



• Manual tuning

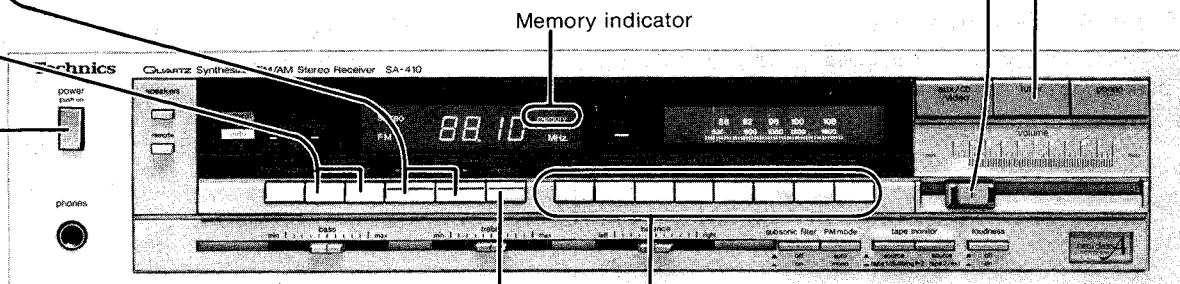
Press the button momentarily frequency will change each time the button is pressed) and tune to the desired station.



1 "0 → 1"

Set volume control to low position for easier tuning.

2 "tuner" ()



6 Press momentarily, and then release.



(The memory indicator will illuminate for approximately 4 seconds.)

Note:

If the button is pressed continuously, the frequency will begin to change, and the memory will be preset automatically. In order to stop the automatic selection, once again press either the "up" button or the "down" button.

7 While the memory indicator is illuminated, press the button of the desired channel.

• To preset channels 1 through 8:



Press the button momentarily, and then release.

• To preset channels 9 through 16:



Press the button slightly longer, and then release.

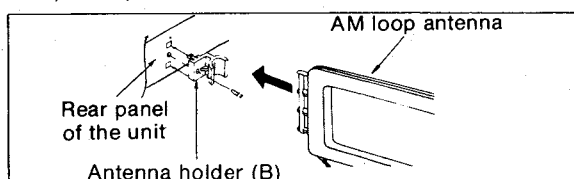
Note:

1. If the memory indication illumination stops before you press the button, once again repeat step (6) and then step (7).
2. If a new broadcasting station is preset into a channel, the broadcasting station which was previously entered in that channel will be automatically erased.

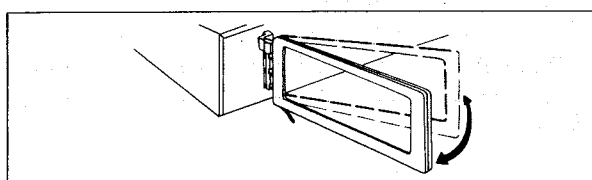
8 Enter the name (call sign, etc.) of the preset broadcasting station on the file sheet.

2) When attaching the antenna to the unit.

This type of installation may cause impaired reception or result in signal noise. If possible, attach the antenna to the rack, a wall, or a column.



3. Move the antenna toward the right or left to find the point of best reception.



DISASSEMBLY INSTRUCTIONS

How to remove the cabinet

1. Remove the 2 setscrews (Fig. 3 : ①, ②) on the side and 3 setscrews (Fig. 3 : ③ ~ ⑤) on the back of the cabinet.
2. Remove the cabinet upward.

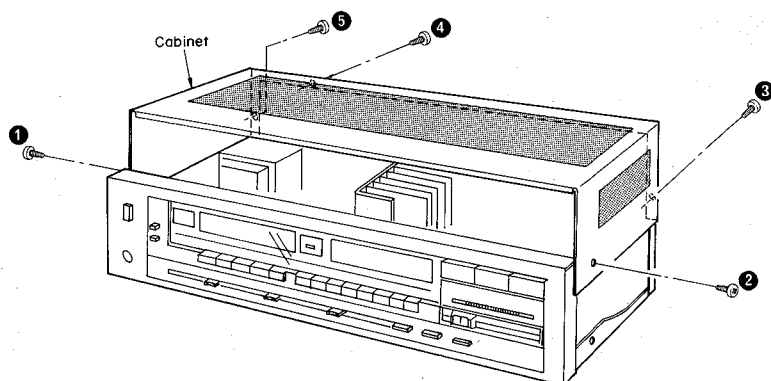


Fig. 3

How to remove the bottom board

1. Remove the 11 setscrews (Fig. 4 : ⑥ ~ ⑮) of the bottom board.
2. Remove the bottom board.

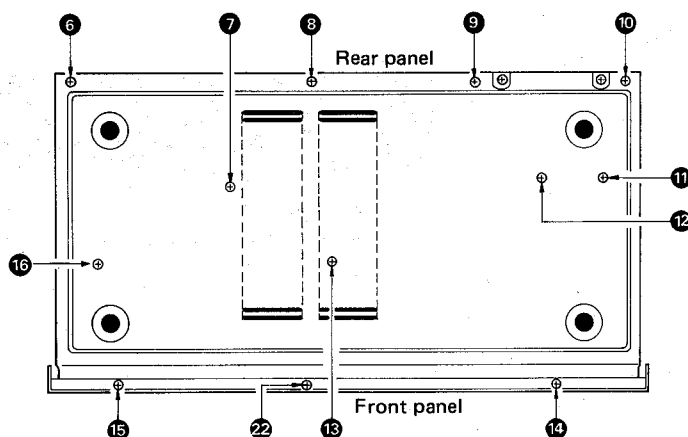


Fig. 4

How to remove the power switch

1. Remove the setscrew (Fig. 5 : ⑰) of the power switch.
2. Next, lay down the power switch P.C.B. as shown in Fig. 6, and remove the power switch from the front panel.

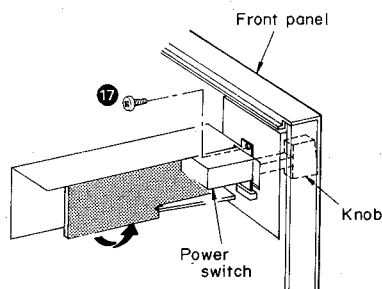


Fig. 5

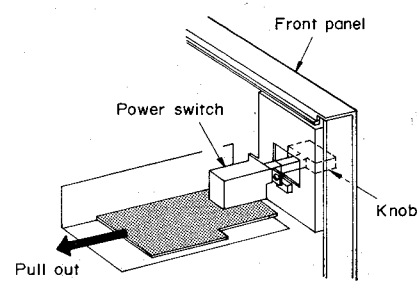


Fig. 6

How to remove the front panel

1. Remove the cabinet.
2. Remove the setscrew (Fig. 7 : ⑱), and then remove the Ica control circuit P.C.B.
3. Disconnect the lead wire of analog frequency meter and press down the meter as shown in Fig. 8 to remove it from the front panel assembly.
4. Release the 2 claws which fasten the quartz lock indicator P.C.B. and sensor indicator P.C.B., and then remove the printed circuit board from the front panel. (See Fig. 9)

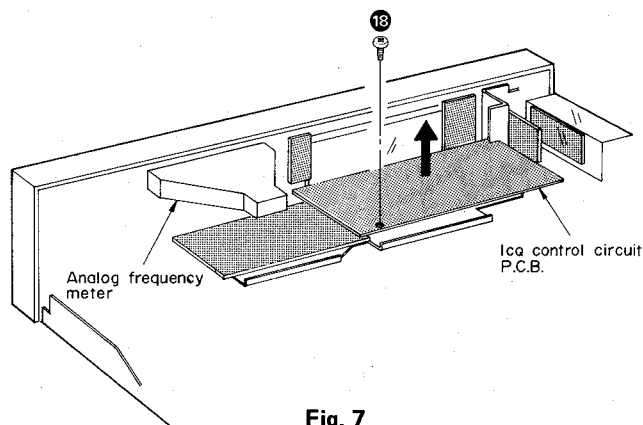
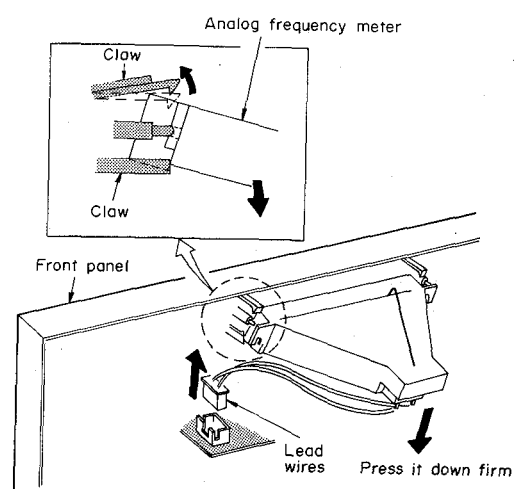
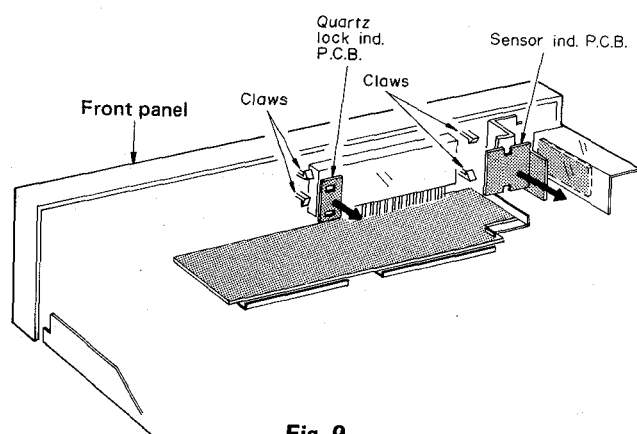
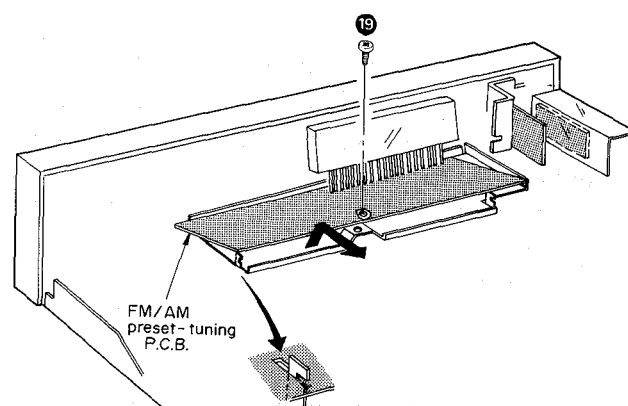
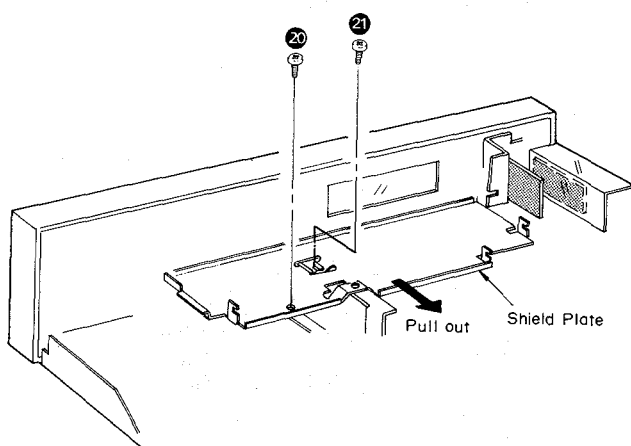
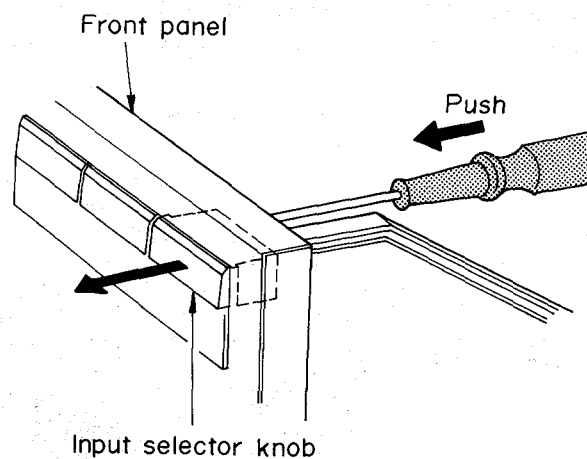


Fig. 7

5. Remove the setscrew (Fig. 10 : 19) of the FM/AM preset-tuning P.C.B. and then detach the FM/AM preset-tuning P.C.B.
6. Remove the 2 setscrews (Fig. 11 : 20 , 21) of the shield plate, and then detach the shield plate.
7. Remove the 3 input selector knobs by pushing them from inside the front panel by use of a screwdriver or the like. (Refer to Fig. 12)
8. Remove the 3 setscrews (Fig. 4 : 14 , 15 , 22) which secure the front panel from the bottom.
9. Next, pull out the front panel toward you. (Refer to Fig. 13)
10. Release the 5 claws at the top of the front panel grille, and then remove the front panel aslant as in Fig. 14.


Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

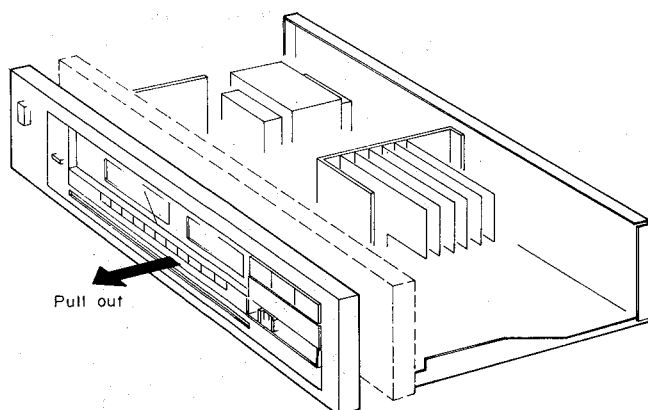


Fig. 13

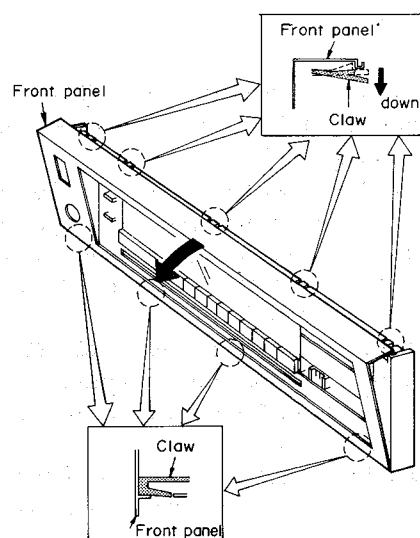


Fig. 14

NOTE

To set the input selector knob, fit the knob to the coupling rod as in Fig. 15, and set it through the front panel before attaching it to the switch.

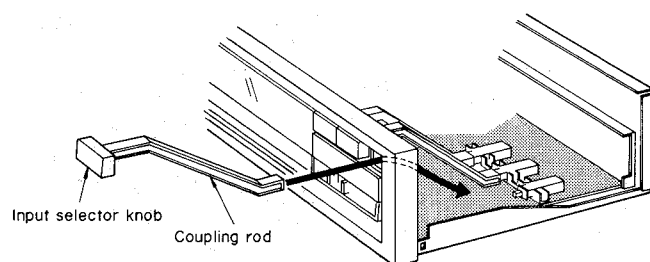


Fig. 15

• How to remove the volume indicator ass'y and volume P.C.B.

1. Remove the cabinet and front panel.
2. The volume indicator ass'y is secured with the 2 claws protected from the volume ornament. So, release the claws with a screwdriver, and pull out the volume indicator ass'y as shown in Fig. 16.
3. The volume P.C.B. is secured with the 2 claws protected from the volume ornament. So, release the claws with a screwdriver, and pull out the volume P.C.B. as shown in Fig. 17.

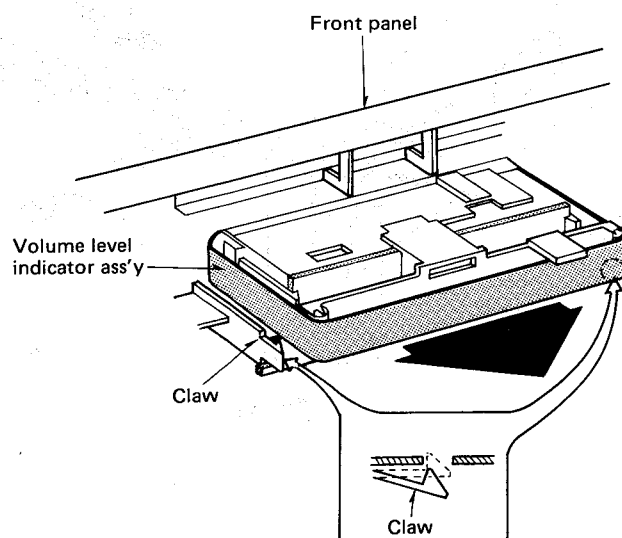


Fig. 16

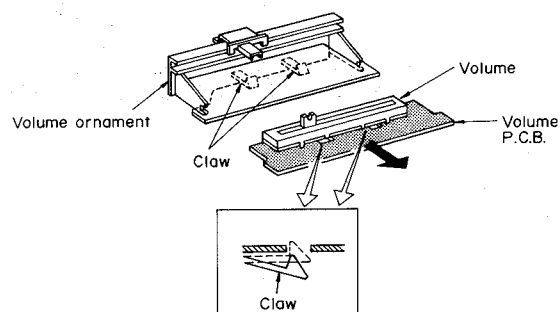


Fig. 17

● How to remove the power amplifier IC

1. Remove the cabinet and bottom board.
2. Unsolder of power IC.
3. Remove the 2 setscrews (Fig. 18 : ㉓ , ㉔) used to secure the power IC on the heat sink, and then pull the power IC.
4. When mounting the power IC, apply silicone compound or equivalent heat diffuser to the rear side of power IC, and then follow the steps 1 ~ 4 reversely.

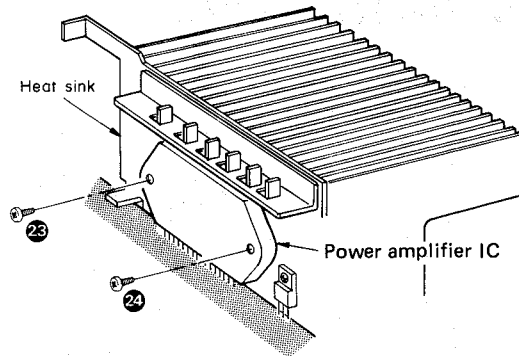


Fig. 18

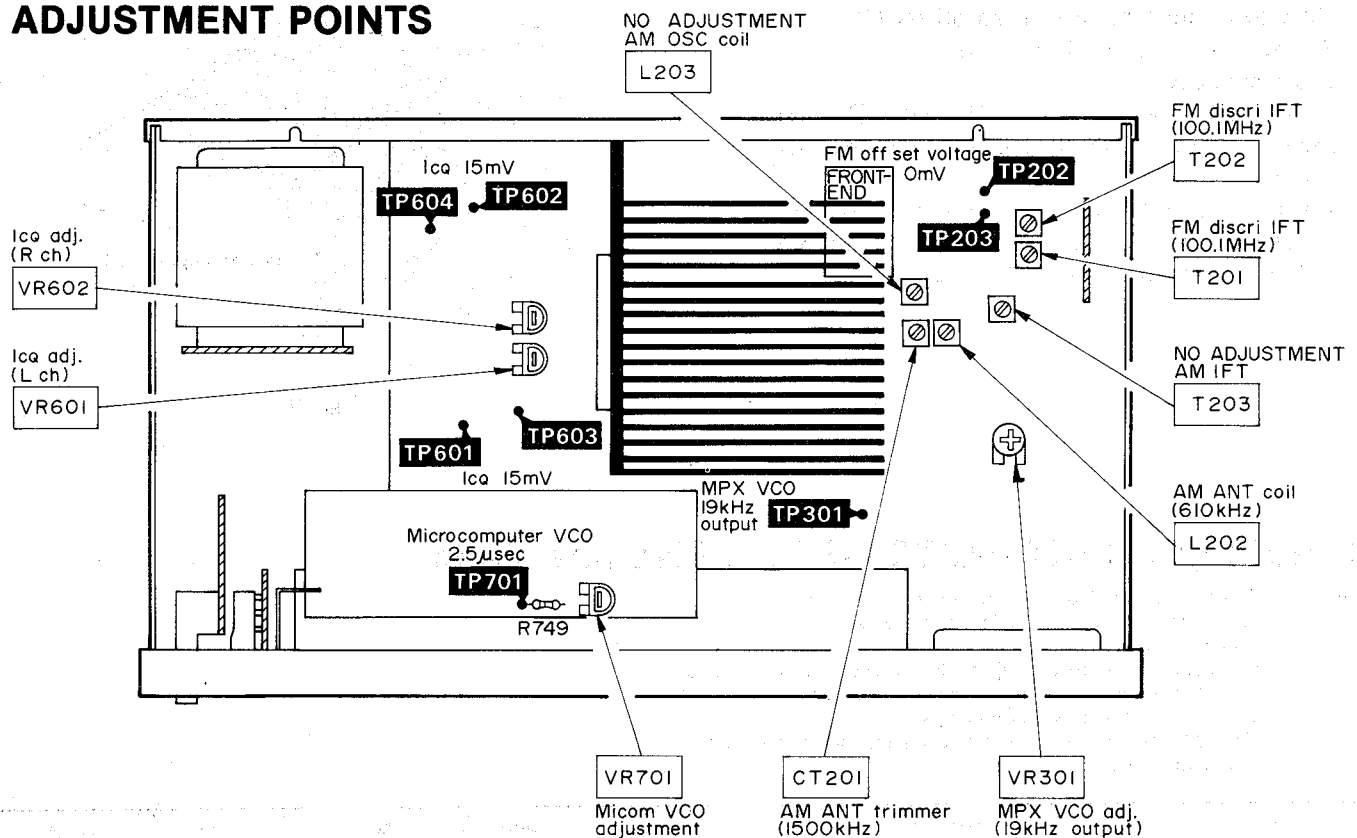
■ REPLACEMENT PARTS LIST.....Electrical Parts

- Note:**
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
 2. Important safety notice:
Components identified by Δ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
 3. The "㉓" mark is service standard parts and may differ from production parts.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
INTEGRATED CIRCUITS			DIODES			VARIABLE RESISTORS		
IC1	AN6558F	Equalizer	D601,602	SVDMC921	Switching	VR601,602	㉓ EVNM4AA00B53	Icq Adjust,5k Ω (B)
IC71	AN7062	Voltage Amp.	D603,604	SVDMC911	Switching	VR701	㉓ EVNM4AA00B14	Micom Vco Adjustment, 10k Ω (B)
IC201	AN278	FM IF	D701~704	Δ ㉓ SVDS3V40	Rectifier	VARIABLE CAPACITORS		
IC202	AN7273B	FM/AM IF Amp, FM/AM Detector	D705,917	㉓ RVDRD6R2EB	6.2V,Zener	CT201	SVCTY121B269	AM Antenna
IC203	SVIUPD4011BC	Scan Indicator	D706	MA1270M	27V,Zener	FRONT END		
IC301	SVIUPC1161C3	MPX	D707	㉓ SVDRD16EB	16V,Zener		SNVFE306E05	FM Front End Ass'y
IC501	SVINU4559DSM	Tone Amplifier	D716	LN0202GP6	L.E.D(Auto)	THERMAL DETECTOR		
IC601	SVISTK2048-2	Power Amplifier	D717	LN0202YP4	L.E.D(Preheat)	PS701	SRPBH47101	60°C
IC701	MN1421STA	Icq Controller	D718~720,	LN446YP	L.E.D(Signal, Thermal)	PS702	SRPBD47101	100°C
IC901	SVID1704C525	Micro-Computer	COILS			THERMISTER		
IC902	SVIUPB553AC	Pre-Scaler	L202	SLA2C5-P	AM Antenna	TH920	ERTD2FHL103S	10k Ω
IC903	AN6873N	FL Driver	L203	SLO2C29R-P	AM Osc	METER		
TRANSISTORS			L601,602	SLQY15G-30	Choke		SSM175-4	Analog Frequency
Q71,72	2SA1123-R	Driver	L701	SLQX101-3M	Choke	FLUORESCENT DISPLAY TUBE		
Q210,211,214~216	2SC1685-Q	Switching,Muting	TRANSFORMERS			FL	SAD7MT29ZA	
603,702,903,904	㉓	FM/AM Scale	T201	SLI4C535-Z	FM IFT	RELAY		
Q212,213,217,251	2SA722-S	Adj & Buffer	T202	SLI4C537-Z	FM IFT	RLY701	Δ SSY91	Speaker
715~721,	㉓	Switching LED	T203	SLI2C143-M	AM IFT	COMPONENT COMBINATIONS		
761~764	㉓	Drive Icq Control	T701	Δ SLT5N413	Power Source	Z301,302	EXRP181K473C	180pF 47k Ω
Q601,602	2SC2631-R	Relay Drive	CERAMIC FILTERS			Z901	EXBP87104M	100k Ω (X7)
Q701	2SD1265-O	Current Stabilizer	CF201,202	{ SVFE107MM-A	FM 10.7MHz(Red)	Z902	EXFP7331MW	330pF(X7)
Q703	2SC1383Q	Regulator		{ SVFE107MM-D	FM 10.65MHz (Black)	LAMPS		
Q704~712	2SC1684-Q	Regulator	CF203	{ SVFE107MX2-A	FM 10.7MHz(Red)	PL1,2	XAMR68S8	8V,0.07A(Volume)
Q713,714	2SA992	Switching		{ SVFE107MX2-D	FM 10.65MHz (Black)	FUSE		
Q901,902	㉓ 2SC945-Q	Overload Detector		(Use pair ranks as same as CF201,CF202 and CF203)		F1	Δ XBA2C16TR0	250V,T1.6A
DIODES			CF204	SVFSFZ450F7L	AM 450kHz	SWITCHES		
D71,72	㉓ MA162A	AM Variable Capacitor	CRYSTAL			S1,3~15	SSG13	Key-Board
D201	SVDKV1236Z	FM Offset	X901	SVQSH452-D	4.5MHz	S17	SSH1031	FM Mode
D206	MA27W-A	Switching	VARIABLE RESISTORS			S401~403	SSH 3049	Input Selector
D207,301,605~610	MA162A	Lock)	VR301,901	EVN75AA00B53	MPX Vco, Frequency Meter	S404~407	SSH1031	Subsonic,Tape, Loudness
710~714,761	㉓	L.E.D(Quartz	VR401	EWFO0105A15S	Adj.5k Ω (B)	S601,602	SSH2047	Speakers(Main, Remote)
901~915,918	㉓	L.E.D(New Class A)	VR501	EVD00305G15S	Volume,100k Ω (A)	S701	Δ SSH1071	Power Source
D208	LN846RP	Balance,	VR502,503	EWD00205C15S	100k Ω (G) Bass Treble, 100k Ω (C)			
D251	LN446YP							
D401	LN0603YP4							

● Replacement parts list of cabinet and chassis parts : Refer to page 40.

ADJUSTMENT POINTS



MEASUREMENTS AND ADJUSTMENTS

AMPLIFIER ADJUSTMENT

* Setting of controls and instruments to be used. 1. Before the adjustment, VR601 and VR602 should be turned in counterclockwise direction. 2. Main speaker switch on 3. Remote speaker switch. off 4. Sound volume. 0 (minimum) 5. DC voltmeter (capable to measure 5 mV) 6. Oscilloscope				
No.	ADJUSTMENTS	DC VOLT METER CONNECTION	PARTS ADJUSTED	ADJUSTING PROCEDURE
1	Adjustment of Icq	(L channel) Between TP601 (–) and TP603 (+).	VR601 (L channel)	1. Connect 8Ω dummy resistor or speaker of 8Ω impedance to main speaker terminal. 2. Turn power supply ON and make sure that AUTO LED (green) is lighted. 3. Adjust VR601 (L channel) or VR602 (R channel) so that the voltage at each test point is 10 mV.
		(R channel) Between TP602 (–) and TP604 (+).	VR602 (R channel)	
2	Adjustment of microcomputer Vco	_____	VR701 (Adjustment of microcomputer Vco)	1. Connect oscilloscope to TP701. 2. Adjust VR701 so that period of waveform is 2.5μsec. (Refer to Fig. 23).

3. Check points

• Overload detection circuit

1. Apply output voltage 5V 1 kHz signal to the auxiliary input terminal.
2. Connect 4Ω (5W) dummy resistor or 4Ω impedance speaker to the main speaker terminal on the left channel.
3. Make sure that no output is delivered when short-circuited with 5W, 0.33Ω resistor.
4. Similarly check the right channel.

* If protection relay turns OFF due to overload, the circuit and load will not restore their normal conditions unless power supply is once turned OFF and again turned ON.

• DC detection circuit

1. Make sure that the relay turns OFF in 3 seconds when ±10V DC input is applied to terminals ⑤8 and ⑤9 of relay (RLY701) P.C.B.

Note: AM OSC coil (L203) and AM IFT (T203) have been already adjusted, and require no adjustment.

AM ADJUSTMENT

Setting and Equipment used

1. AC electronic voltmeters (VTVM).

2. AM signal generator (AM-SG).

3. Set Band selector to "AM" position.

4. Maintain line voltage at rated volts.

5. AM allocation to "10 kHz step" position.

6. Output of signal generator should be no higher than necessary to obtain an output reading.

7. Use a non-metal screwdriver for the adjustment.

AM SIGNAL GENERATOR		DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
CONNECTION	FREQUENCY				
AM-RF ADJUSTMENT					
Connect AM-SG to AM antenna terminal through 200pF capacitor. Common to chassis. (Weak input) (Refer to Fig. 19)	610 kHz (30% Mod. with 400 Hz)	610 kHz	Connect AC VTVM or scope to "speaker" terminal of the set.	L202 (ANT Coil)	1. Adjust for maximum output. 2. Adjust core of L202 by screwdriver.
	1500 kHz (30% Mod. with 400 Hz)	1500 KHz	Connect AC VTVM or scope to "speaker" terminal of the set.	CT201 (ANT Trimmer)	1. Adjust for maximum output. 2. Repeat steps (1) and (2) until the frequency correctly matches the frequency display.

FM ADJUSTMENT

* Setting and Equipment used 1. FM signal generator (FM-SG). 2. Distortion analyser. 3. Oscilloscope. 4. DC electronic voltmeters (VTVM). 5. Frequency counter (19 kHz and 108 MHz measurable). 6. Set band selector to "FM" position. 7. Set FM mode selector to "mono" position. 8. Other setting are the same as in AM adjustment.				* Preparation of FM signal generator (FM-SG) 1. The standard input of the set is 60 dB (1 mV) , 400 Hz, 100% modulation (Because of attenuation, using coaxial cables. SG output must be 6 dB plus. That is, when input 60 dB, SG output is to be 66 dB.)	
FM SIGNAL GENERATOR		DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
CONNECTION	FREQUENCY				
FM MONO DISTORTION ADJUSTMENT					
Connect FM-SG to FM antenna terminal referring to Fig. 20. (Apply 60 dB to antenna terminal)	100.10 MHz (100% Mod. with 400 Hz)	100.10 MHz	Connect DC VTVM to between TP202 and TP203 through choke coil. (Refer to Fig. 20)	T201 (Discri. IFT)	1. Adjust T201 core so that voltage measured in signal mode is 0 mV in 300 mV range. 2. Adjust T202 core so that distortion of right and left channels are minimized.
	100.10 MHz (100% Mod. with 400 Hz)	100.10 MHz	Connect distortion analyser to "speaker" terminal of the set.	T202 (Discri. IFT)	
FM MPX V.C.O. ADJUSTMENT					
USING A FREQUENCY COUNTER			USING ALTERNATE SYSTEM		
1. 100 MHz, 60 dB Non-modulated mono signal applied to set. 2. FM mode switch to "auto" position. 3. Connect frequency counter to TP301 through resistor (100kΩ) referring to Fig. 21. 4. Adjust VR301 to 19 kHz ± 30 Hz.			1. Apply stereo signal from generator or stereo station to tuner. 2. Adjust VR301 until stereo indicator lights up. Cement arm of VR301 as shown in Fig. 22.		
FM ANALOG FREQUENCY METER					
_____	No-Signal	96.10 MHz	_____	VR901 (Frequency meter)	1. Adjust VR901 so that the analog frequency meter indicates 96.10 MHz. (Refer to Fig. 24) 2. Next operate the tuning button so that 88.10MHz and 107.90MHz are indicated in the digital frequency display. Then make sure that the indicator is in contact with each letter. 3. If the requirement in step 2 is not satisfied, go back to step 1 and adjust the indicator within the dotted line of Fig. 24.

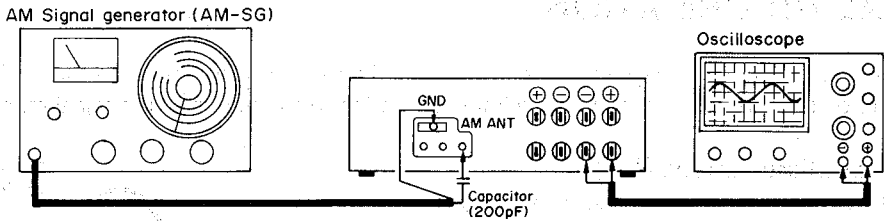


Fig. 19 (Adjustment of AM)

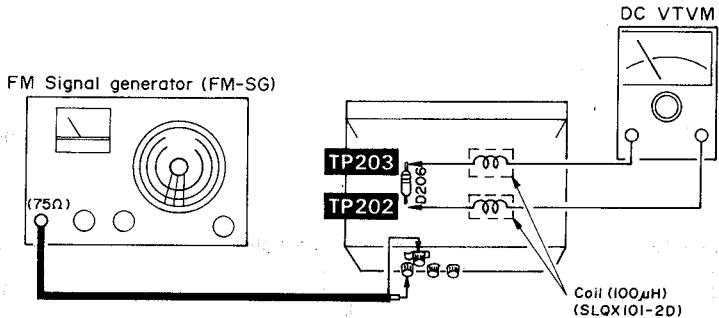


Fig. 20 (Adjustment of FM offset)

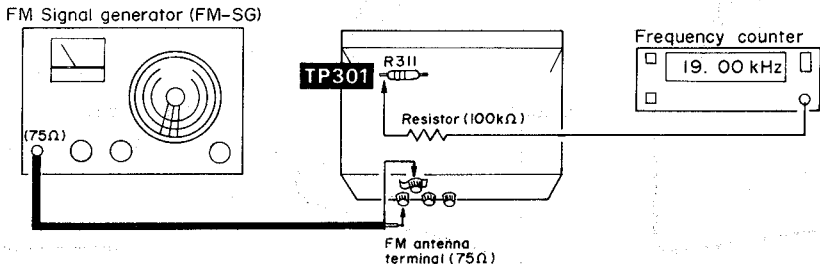


Fig. 21 (Adjustment of FM MPX VCO)

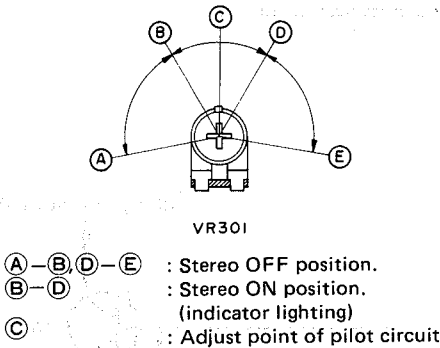


Fig. 22 (Adjustment of FM MPX VCO)

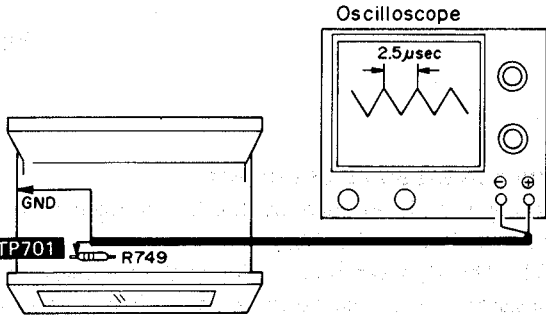


Fig. 23 (Adjustment of amplifier)

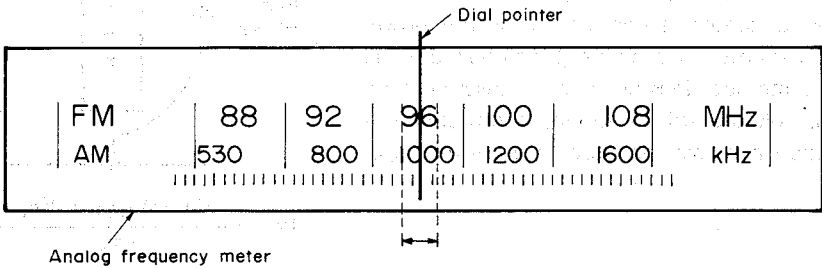


Fig. 24 (FM analog frequency meter)

TECHNICAL INFORMATION

Technics New Class A amplifier circuitry eliminates switching and crossover distortion. To further improve fidelity a "computer drive" circuit has been incorporated to eliminate transient distortion in music signal reproduction.

Power transistor idling current (I_{ca})

The idling current through the power transistors is adjusted so that crossover distortion is minimized when switching from the NPN transistor to the PNP transistor in a complementary design (Fig. 25).

If I_{ca} is not adjusted properly, distortion will result as in Fig. 26.

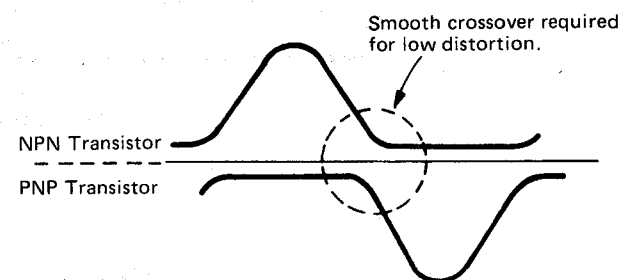
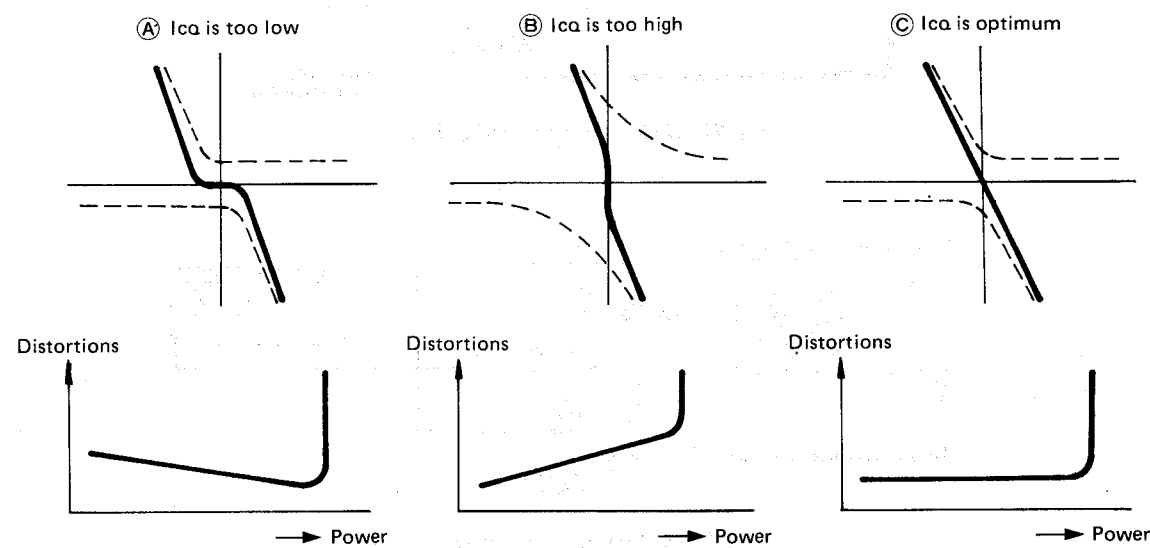


Fig. 25



Relationship between idling current level and cross-over distortion.

Fig. 26

Idling current and bias current

Idling current is determined by the bias voltage (V_b) of the bias circuit and the V_{BE} of each power transistor (Fig. 27). The V_{BE} varies according to the temperature of the transistor. This temperature varies instantaneously with the music signal. Unfortunately, with current designs, these instantaneous fluctuations cannot be detected due to the placement of the thermal sensor and the slow temperature change of the heat sink. Attempts have been made to include a thermal sensor as part of the output power pack. However, most power packs do not include a thermal sensor. Also, this method does not work if discrete components are used. We are still faced with the problem of stable bias operation and fast response to abrupt changes in temperature.

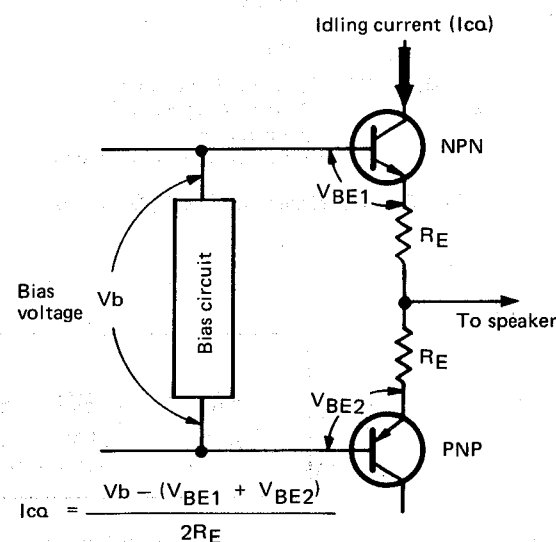
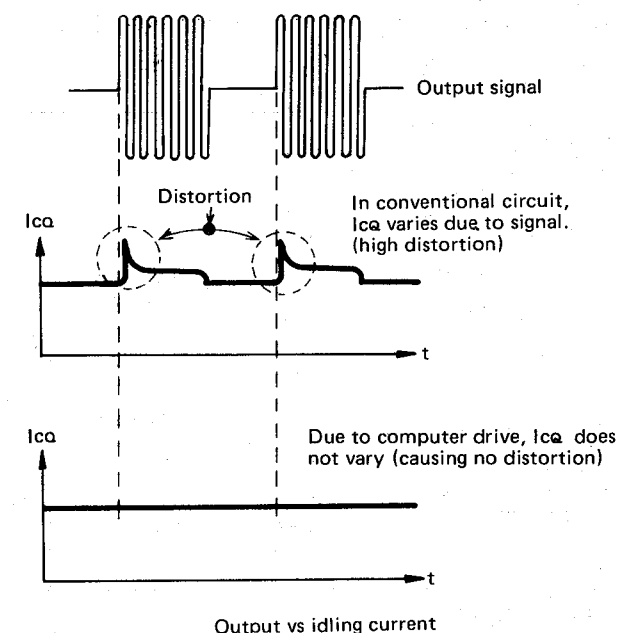


Fig. 27

Computer drive system

Knowing the thermal and signal characteristics of the power transistors, a system can be designed to calculate the instantaneous temperature changes and adjust for the optimum idling current. Information regarding the transistor ambient temperature and the input music signal is obtained through sensors and fed to a computer. The computer calculates the optimum idle current and maintains it at a constant level by varying the bias voltage. Figure 28 illustrates the relationship of the output signal and the idling current. Figure 29 is a block diagram of the "computer drive" system.

Generally, it takes several minutes for the power transistors to reach the temperature of stable operation after the power is turned on. To ensure stable and optimum performance quickly, the microcomputer forces a large amount of idling current through the power transistors for a short time. This rapidly "preheats" the transistors and the heat sink. Figure 30 illustrates the stable operation level for the conventional and new computer drive system.



Output vs idling current

Fig. 28

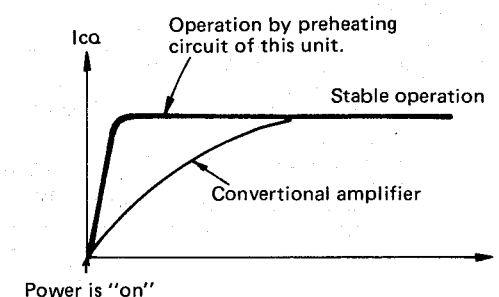


Fig. 29

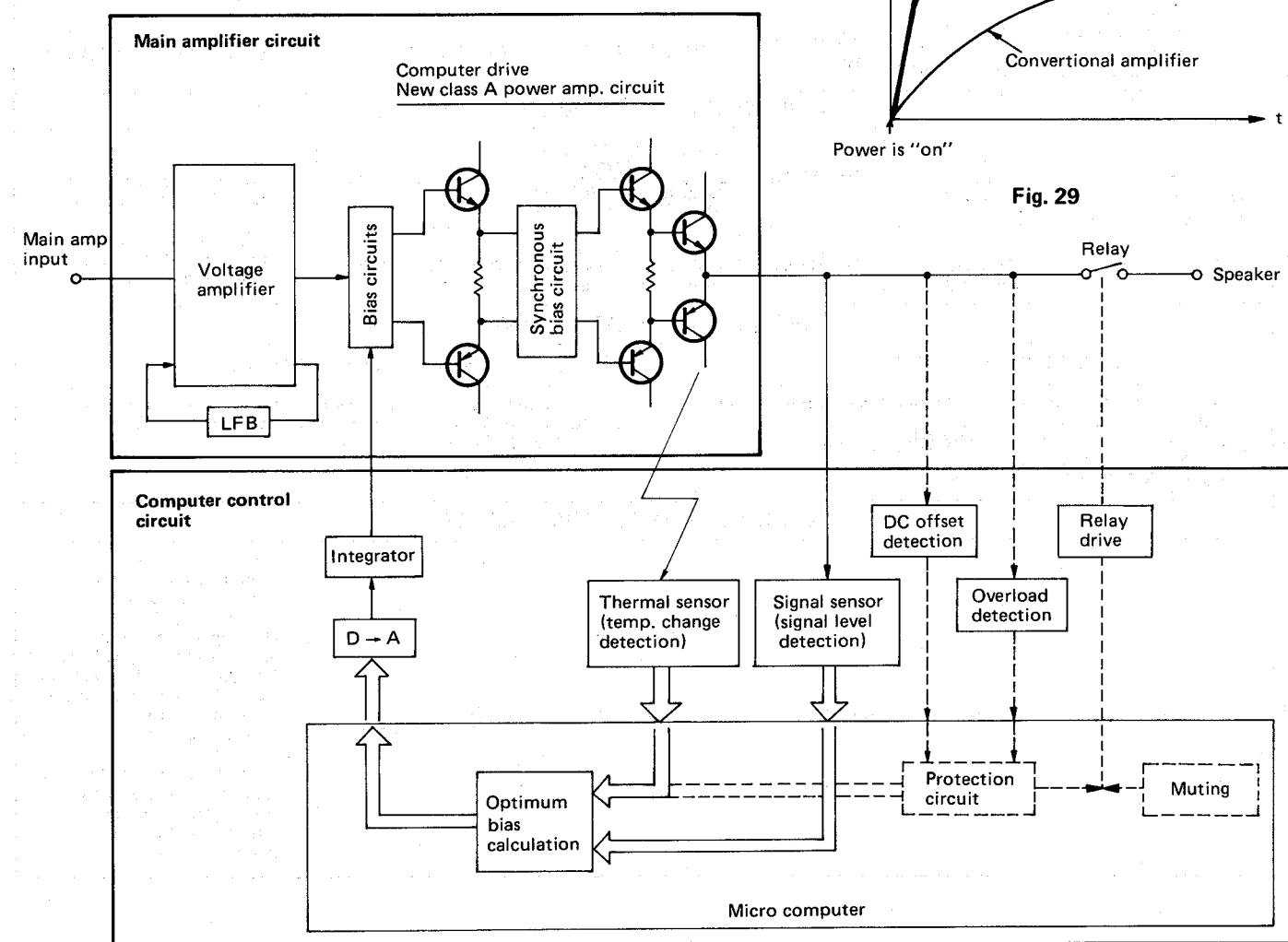


Fig. 30

Computer-drive monitor indicators

To prevent transient crossover distortion*, a stabilized idling current (ICQ) through the power transistors is constantly necessary. ICQ will vary with the signal level and the instantaneous temperature of the power transistors. The microcomputer will optimize ICQ automatically by preheating the power transistors and sensing the signal level and the temperature of the power transistors. *Transient crossover distortion is caused by momentary fluctuations of the ICQ level.

ICQ: When the power is turned on the "preheat" indicator will illuminate. This shows that a high level of ICQ is flowing through the power transistors to achieve circuit stability quickly. When "auto" illuminates, the optimum ICQ level flowing and being controlled by the microcomputer.

Icα: The radiator is preheated in order to assure immediate operation of the bias circuit when the power is switched on.

preheat indicator — During this preheating, the "preheat" indicator illuminates.

auto indicator — When the circuit is stable, the "auto" indicator illuminates.

• **LED ON operation with power ON**
(When power supply is turned ON, Vcc is applied to pin 20 (reset) of IC701(MN1421STA), causing the program operation to start.

about 14.5 sec.

Output port	17 pin EO2	23 pin DO0	3 pin CO8	2 pin CO9	4 pin CO7	26 pin DO3
indicator	Icα auto	Icα preheat	bias low	bias high	sensor thermal	Muting
Power "ON"	L	L	L	L	L	Muting ON
0.5 sec.						
1 sec.	H			H	H	
1 sec.			H	L		
1 sec.				H	L	
1 sec.			L		H	
10 sec.						Relay ON
	L	H	LED turns ON/OFF according to the signal level or temperature alteration.			

This operation is programed

"ON" (light up) time

Sensor:

- **Signal**
When the signal level is very low, both the "low" and "high" indicators will illuminate. As the signal level is increased, the "low" indicator will go out. When the signal level is further increased both indicators will be out.
 - **Thermal**
When the "thermal" indicator illuminates, the temperature of the heatsink is low and no adjustment of ICQ is required by the microcomputer. When the "thermal" indicator goes off, the microcomputer is adjusting the ICQ because of the temperature rise of the heatsink.
- Note:** The microcomputer runs a self check program before the "auto" indicator illuminates.

Sensor: When the "auto" indicator illuminates, the music signal level and the temperature of the radiator and output transistor are detected.

low indicator } * No signal: both low and high LED's are on.
high indicator } * Low signal: low LED is off.
 * High signal: both high and low LED's are off.

thermal indicator — Temperature of the radiator exceeds 60°C (140°F), thermal LED turns off.

FUNCTION OF TERMINAL (Icα CONTROLLER IC503)

Pin No.	Mark	Name of block	Description of terminal
1	Vss	Power supply input terminal	Grounded (0V)
2	CO9	Output port C	It delivers Icα control signal through input port A (thermal sensor) and input port B (signal sensor). [Output "L"]
3	CO8		
4	CO7		
5	CO6		
6	CO5		
7	AI3	Input port A	Grounded (0V)
8	AI2		Apply 5V
9	AI1		Input level changes to "L" at 60° (140°F) thermal sensor of power amplifier operates.
10	AI0		
11	BI3	Input port B	Input level changes to "L" as effective output 2V signal sensor of power amplifier operates.
12	BI2		Input level changes to "L" as effective output 4V signal sensor of power amplifier operates.
13	BI1		
14	BI0		Apply 5V

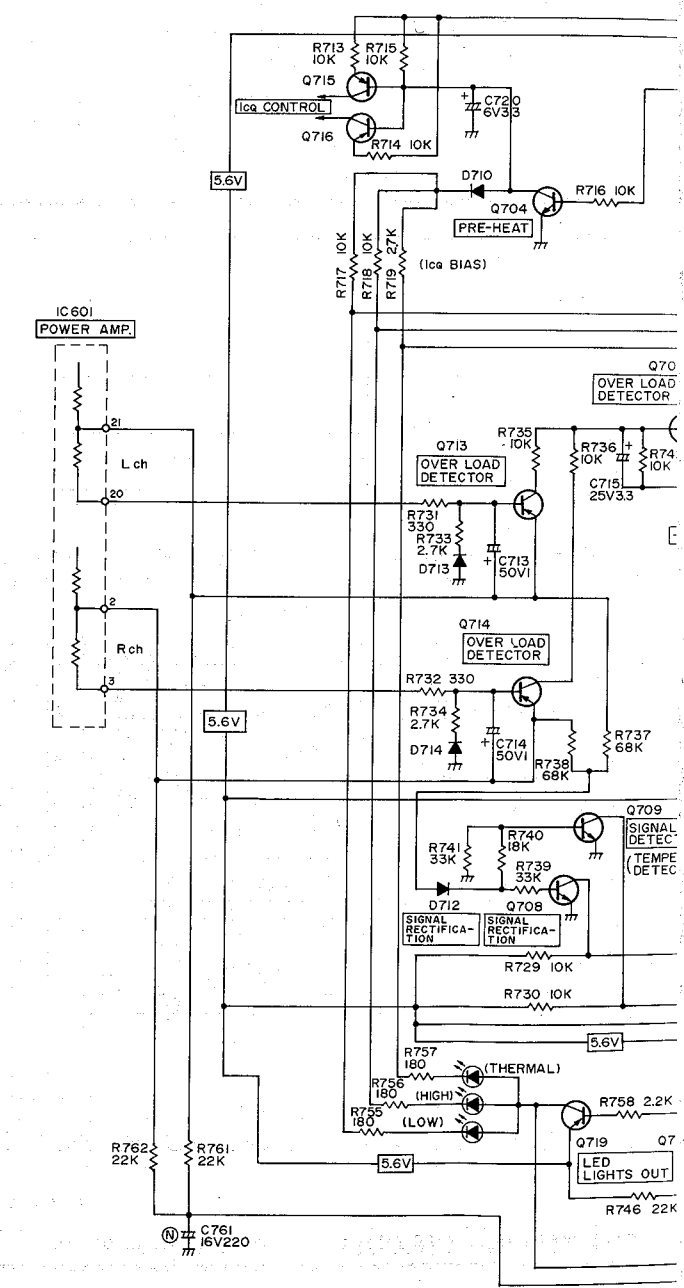
15	EO0
16	EO1
17	EO2
18	EO3
19	TST
20	RST
21	SNS
22	SNS
23	DO0
24	DO1
25	DO2
26	DO3
27	VDE
28	OSC

Icα control circuit

- a) **Preheat**
When the power is turned on pin 23 (DO0) of IC701 goes low. Q721 turns on, illuminating the preheat LED (D717). Q704 also turns on. Q715 (Q716) conducts heavily and increases the Icα through Q601 (Q602) to pin 14 (9) of IC601. For approximately 15 seconds the Icα should be 2 times higher than normal.
- b) **Signal sensor**
Q708 is set to turn on when the output from pin 21 (2) of IC601 exceeds 2V. At that time pin 11 (BI3) of IC701 goes low and pin 2 (CO9) goes high. The "low" LED turns off. The collector current of Q715 (Q716) reduces and decreases the bias current. Q709 turns on when the output exceeds 4V. Pin 12 (BI2) goes low and pin 3 (CO8) goes high. The "high" LED turns off and the current through Q715 (Q716) is further decreased.
- c) **Thermal sensor**
When the thermistor (PS701) temperature reaches 60°C (140°F), Q711 turns on. Pin 10 (AI0) of IC701 goes low and pin 4 (CO7) goes high. This causes a decrease in the collector current of Q715 (Q716) and the thermal LED (D720) turns off. The combination of the signal and thermal sensors serve to change the total impedance of R717 ~ R719 (Bias) to determine the level of Icα applied.

Muting circuit

When the power is turned on, pin 26 (DO3) of IC701 goes high for about 4 secones, Q710, Q718 and Q603 turn on to activate the relay (RLY701). When the power is turned of, Q705 turns off and pin 20 (RST) of IC701 goes low. Pin 26 (DO3) also goes low and Q710, Q718 and Q603 turn off to disable the relay over-load detector. When there is a large amount of signal the voltage across R731 (R732) increases to the point that Q713 (Q714) turns on, pin 22 (SNS1) of IC701 goes high and pin 26 (DO3) goes low to disable the relay (RLY701).



FUNCTION OF TERMINAL (Ic_a CONTROLLER IC503)

Pin No.	Mark	Name of block	Description of terminal
1	V _{SS}	Power supply input terminal	Grounded (0V)
2	CO ₉	Output port C	It delivers I _{c_a} control signal through input port A (thermal sensor) and input port B (signal sensor). [Output "L"]
3	CO ₈		
4	CO ₇		
5	CO ₆		
6	CO ₅		
7	AI ₃	Input port A	Grounded (0V)
8	AI ₂		Apply 5V
9	AI ₁		Input level changes to "L" at 60° (140°F) thermal sensor of power amplifier operates.
10	AI ₀		Input level changes to "L" as effective output 2V signal sensor of power amplifier operates.
11	BI ₃	Input port B	Input level changes to "L" as effective output 2V signal sensor of power amplifier operates.
12	BI ₂		Input level changes to "L" as effective output 4V signal sensor of power amplifier operates.
13	BI ₁		Apply 5V
14	BI ₀		

15	EO ₀	Output port E	Not used in this unit.
16	EO ₁		Indicator "auto" lights up at "L" output.
17	EO ₂		Not used in this unit.
18	EO ₃		Terminal for testing LSI (Grounded)
19	TST	Test input terminal	All outputs are cleared or reset with input at "L". (It is connected to power supply circuit)
20	RST	Reset input terminal	Not used in this unit.
21	SNS ₀	Sensor input terminal	Input level changes to "H" as power amplifier output short-circuit detector operates.
22	SNS ₁		Output terminal for indicator "preheat" and preheating circuit operation. [Output "L"]
23	DO ₀	Output port D	Not used in this unit.
24	DO ₁		Output relay turns ON with output at "H".
25	DO ₂		Apply 5V.
26	DO ₃		Clock signal (about 400 kHz) can be obtained by internal oscillation circuit.
27	V _{DD}	Power supply input terminal	Apply 5V.
28	OSC	OSC input terminal	Clock signal (about 400 kHz) can be obtained by internal oscillation circuit.

• Ic_a control circuit

a) Preheat

When the power is turned on pin 23 (DO₀) of IC701 goes low. Q721 turns on, illuminating the preheat LED (D717). Q704 also turns on. Q715 (Q716) conducts heavily and increases the I_{c_a} through Q601 (Q602) to pin 14 (9) of IC601. For approximately 15 seconds the I_{c_a} should be 2 times higher than normal.

b) Signal sensor

Q708 is set to turn on when the output from pin 21 (2) of IC601 exceeds 2V. At that time pin 11 (BI₃) of IC701 goes low and pin 2 (CO₉) goes high. The "low" LED turns off. The collector current of Q715 (Q716) reduces and decreases the bias current. Q709 turns on when the output exceeds 4V. Pin 12 (BI₂) goes low and pin 3 (CO₈) goes high. The "high" LED turns off and the current through Q715 (Q716) is further decreased.

c) Thermal sensor

When the thermistor (PS701) temperature reaches 60°C (140°F), Q711 turns on. Pin 10 (AI₀) of IC701 goes low and pin 4 (CO₇) goes high. This causes a decrease in the collector current of Q715 (Q716) and the thermal LED (D720) turns off.

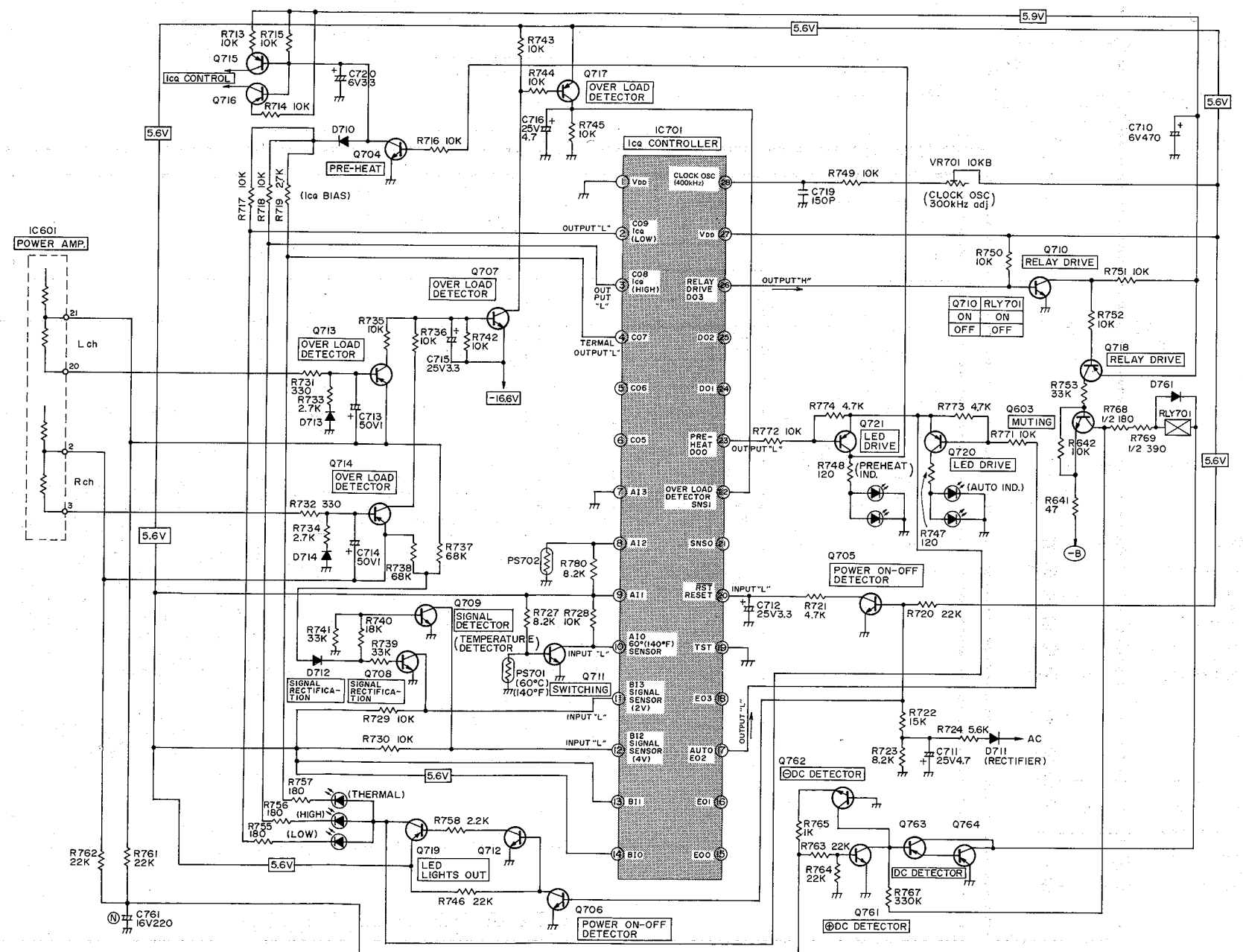
The combination of the signal and thermal sensors serve to change the total impedance of R717 ~ R719 (Bias) to determine the level of I_{c_a} applied.

• Muting circuit

When the power is turned on, pin 26 (DO₃) of IC701 goes high for about 4 seconds, Q710, Q718 and Q603 turn on to activate the relay (RLY701).

When the power is turned off, Q705 turns off and pin 20 (RST) of IC701 goes low. Pin 26 (DO₃) also goes low and Q710, Q718 and Q603 turn off to disable the relay over-load detector.

When there is a large amount of signal the voltage across R731 (R732) increases to the point that Q713 (Q714) turns on, pin 22 (SNS₁) of IC701 goes high and pin 26 (DO₃) goes low to disable the relay (RLY701).



both the "low" and "high" indicators will be illuminated, the temperature of the power amplifier is detected.

When the microcomputer is powered on, the temperature rise of the power amplifier is detected.

Before the program is executed, the temperature of the power amplifier is detected.

When the temperature of the power amplifier is detected, the "low" LED turns off.

When the temperature of the power amplifier is detected, the "high" LED turns off.

When the temperature of the power amplifier is detected, the thermal LED turns off.

26 pin DO₃

Muting ON

Muting ON

Relay ON

Relay ON

Relay ON

Relay ON

Relay ON

Relay ON

Relay ON

Relay ON

Relay ON

Relay ON

Relay ON

Relay ON

Relay ON

Relay ON

Relay ON

Relay ON

Relay ON

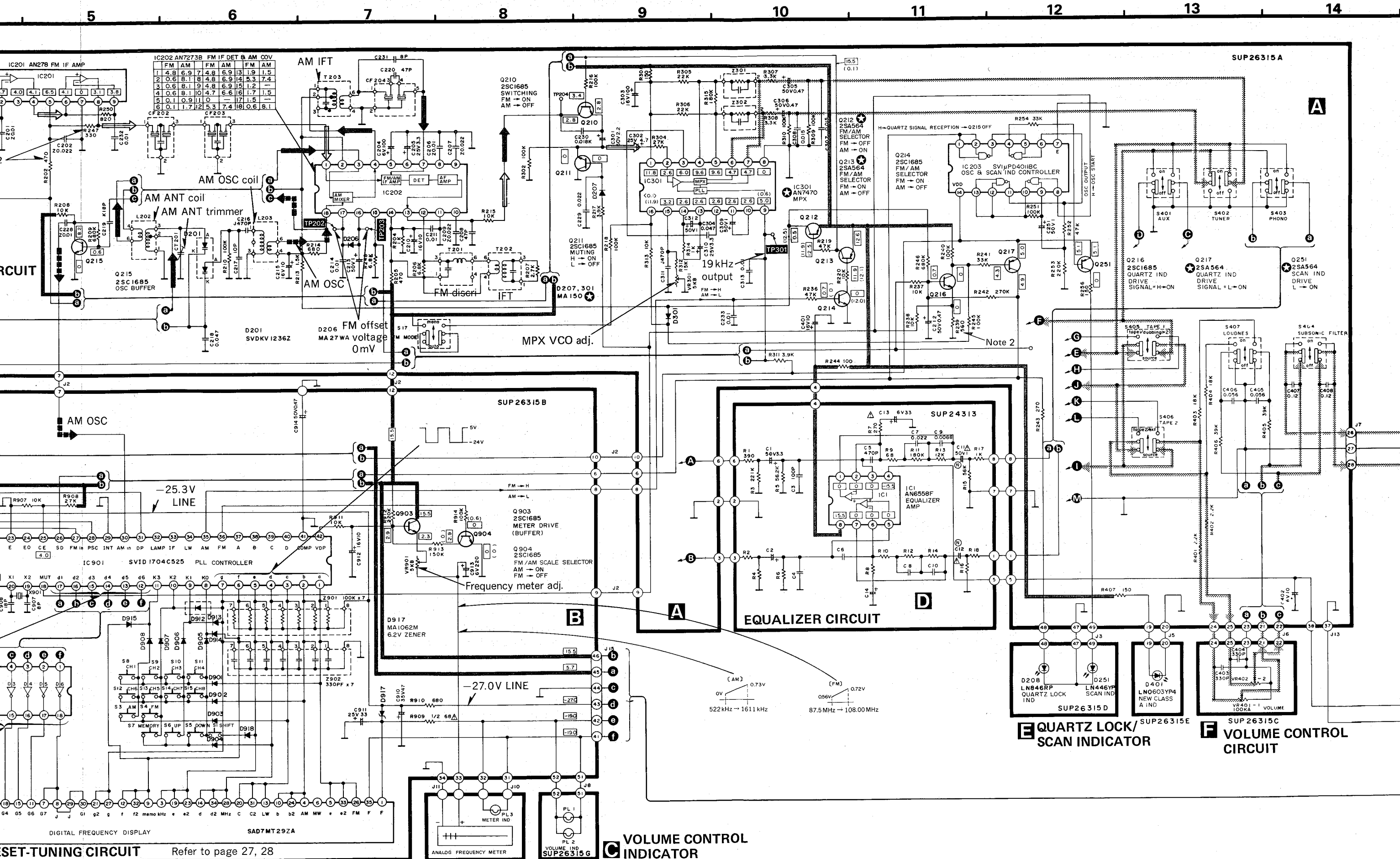
Relay ON

Relay ON

Relay ON

Relay ON

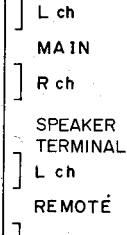




SUB 26295A



SUP 26295 I



Adjustment of microcomputer Vco

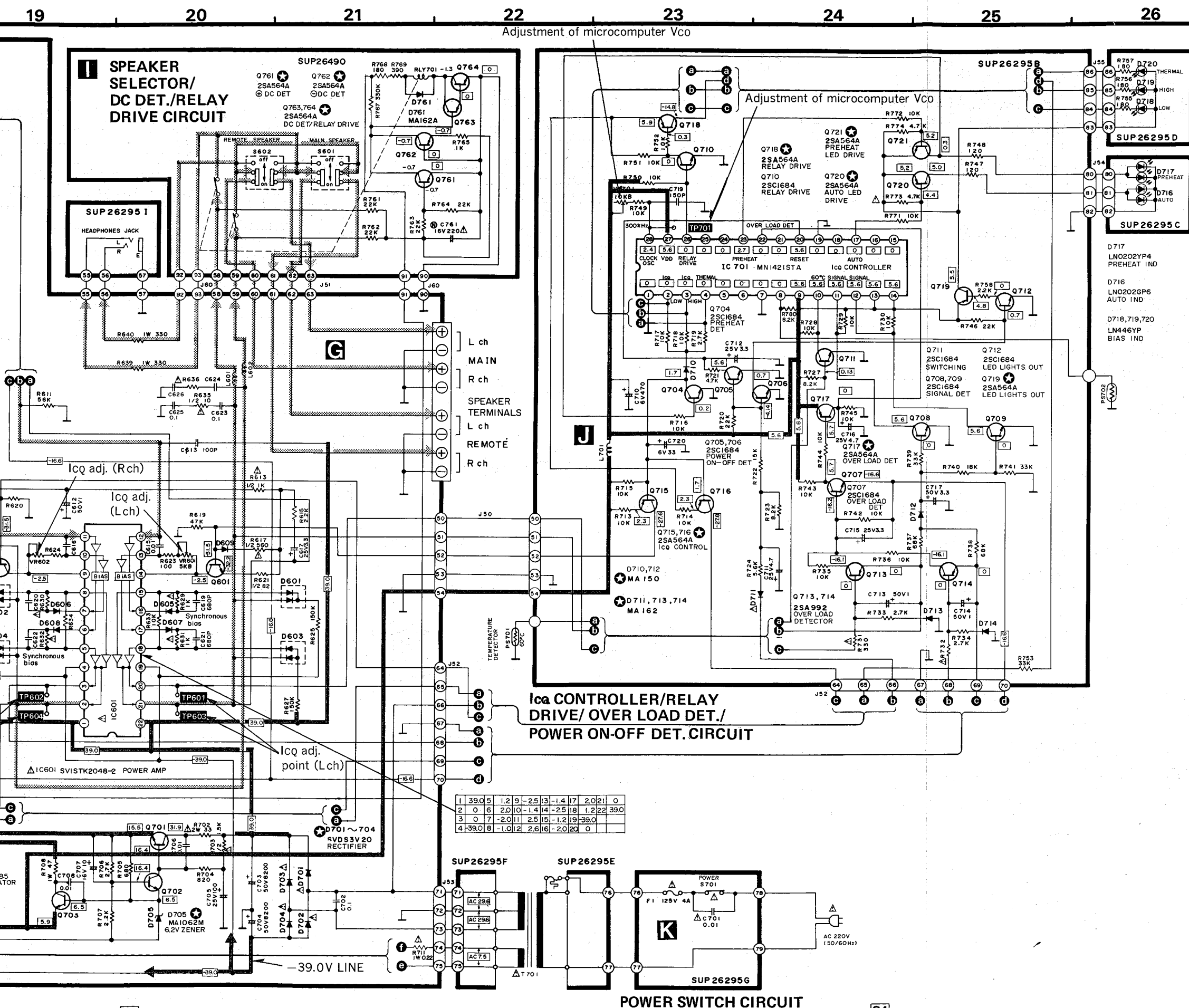


SUP26295F SUP26295E

24

ne with the development of new technology.)

• Equalizer/Voltage amp./Tone amp./Ica controller/Power amp. circuit



* The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with $\star$ mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement part, please use the part No. in the replacement part list.

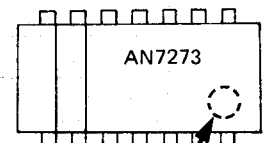
Note 1:

1. **S3, 4** : Band selector switch.
S3 - AM S4 - FM
2. **S5, 6** : Tuning switch.
S5 - down (tuning to lower frequency)
S6 - up (tuning to higher frequency)
3. **S7** : Memory switch.
(manual $\leftrightarrow$ auto)
4. **S8 ~ S15** : Preset tuning switch.
S8 - CH1 S11 - CH4 S14 - CH7
S9 - CH2 S12 - CH5 S15 - CH8
S10 - CH3 S13 - CH6
5. **S17** : FM mode switch.
(auto $\leftrightarrow$ mono)
6. **S401 ~ S403** : Input selector switch in "tuner" position.
S401 - aux
S402 - tuner
S403 - phono
7. **S404** : Subsonic filter switch in "off" position.
(off $\leftrightarrow$ on)
8. **S405** : Tape monitor (tape 1) switch in "source" position.
source $\leftrightarrow$ tape 1/dubbing 1 $\rightarrow$ 2
9. **S406** : Tape monitor (tape 2) switch in "source" position.
source $\leftrightarrow$ tape 2
10. **S407** : Loudness switch in "off" position.
off $\leftrightarrow$ on
11. **S601** : Main speaker switch in "off" position.
off $\leftrightarrow$ on
12. **S602** : Remote speaker switch in "off" position.
off $\leftrightarrow$ on
13. **S701** : Power source switch in "on" position.
off $\leftrightarrow$ on
14. Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
* Figures in $\square$ stand for DC voltage in FM signal (monaural signal) reception mode.
* Figures in $\triangle$ stand for DC voltage in FM stereo signal reception mode.
* Figures in $\circ$ stand for DC voltage in AM signal reception mode.
15. **D** : Positive voltage lines $\rightarrow$ AF signal lines
FM signal $\rightarrow$ FM OSC
AM signal $\rightarrow$ AM OSC
16. Important safety notice:
Components identified by Δ mark have special characteristics important for safety.
When replacing any of these components use only manufacturer's specified parts.

Note 2:

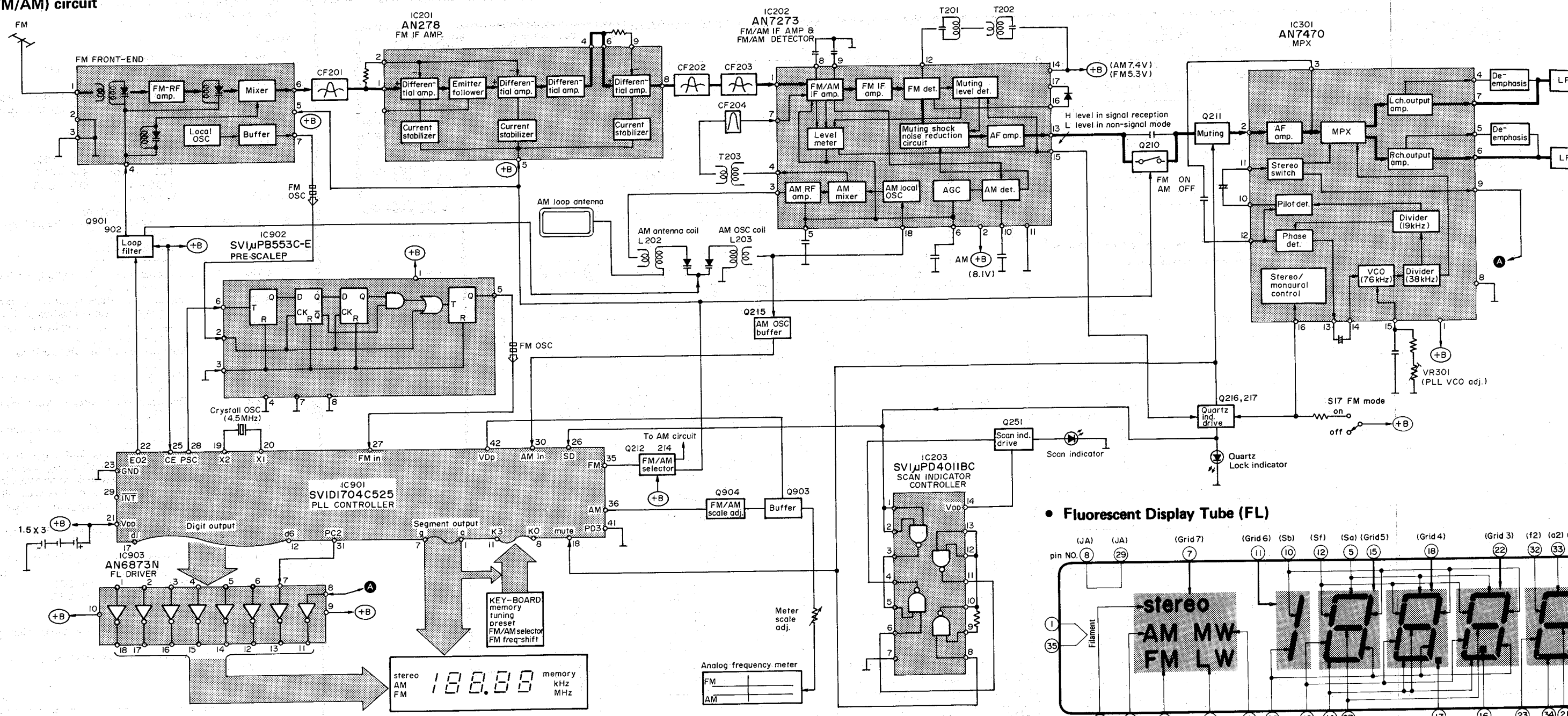
AN7273 (IC202) is available in A rank (AN7273A) and B rank (AN7273B). Either rank can be used for this unit, but the suitable resistor must be used according to the rank as shown in the table below. So, keep this point in mind when repairing or replacing the unit.

RANK	A	B
Ref. No.		
R202	680 Ω	470 Ω
R239	680 Ω	560 Ω
R250	470 Ω	820 Ω

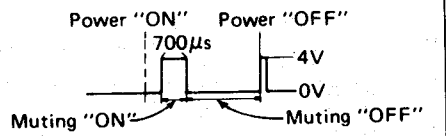


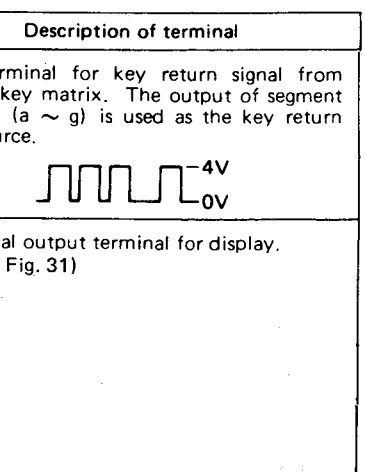
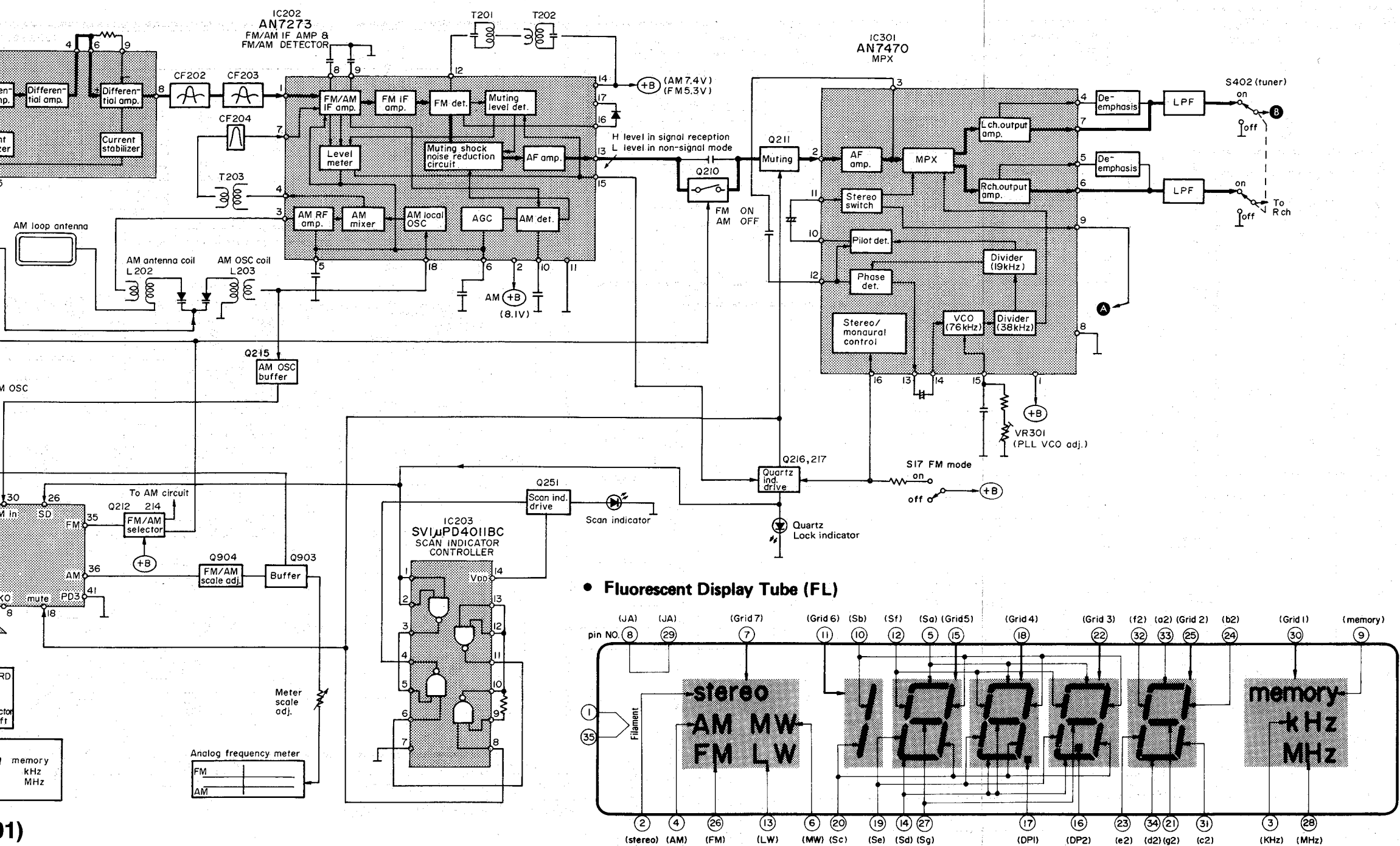
"A" painted in this position or red mark on main body stands for A rank, and similarly, "B" or green mark stands for B rank.

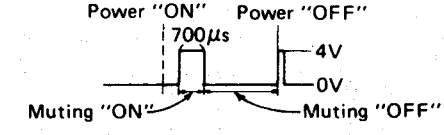
■ BLOCK DIAGRAM
• Tuner (FM/AM) circuit



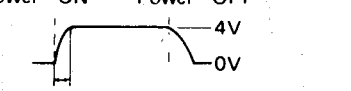
■ FUNCTION OF TERMINAL (PLL CONTROLLER IC901)

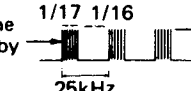
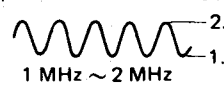
Pin No.	Mark	Description of terminal	Pin No.	Mark	Description of terminal	Pin No.	Mark	Description of terminal	Pin No.	Mark	Description of terminal
1	Sa	Segment signal output terminal for display. (Refer to Fig. 31)	8	K0	Input terminal for key return signal from external key matrix. The output of segment terminals (a ~ g) is used as the key return signal source. 	18	MT	This is the output terminal to eliminate shock noise due to unlocking at PLL. When the CE terminal is at low level, the output from this terminal is at high level. 	22	E01	When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (0V) output is delivered. When they coincide, it results in floating.
2	Sb		9	K1					23	GND	
3	Sc		10	K2	Digit signal output terminal for display. (Refer to Fig. 31)	19	X2		24	E02	
4	Sd		11	K3		20	X1		25	CE	This is the selected signal input terminal of the device. When operating the device, make the level high, and when it is not used, make the level low. When this terminal is at low level, all the segment (a ~ g) and digits (D1 ~ D6) terminals are off, but the memory is held.
5	Se		12	D6							
6	Sf		13	D5							
7	Sg		14	D4							
			15	D3							
			16	D2							
			17	D1							

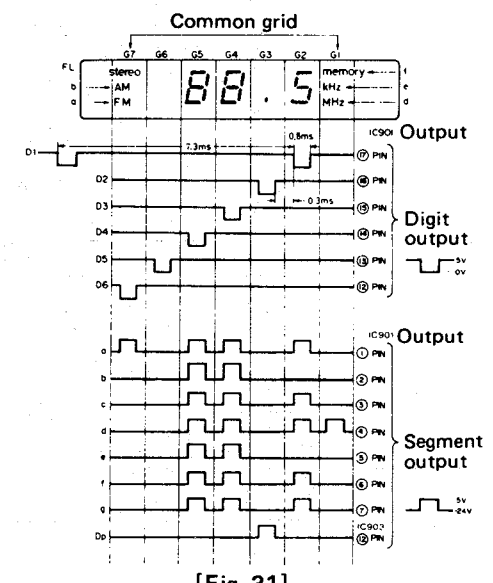


Pin No.	Mark	Description of terminal
18	MT	This is the output terminal to eliminate shock noise due to unlocking at PLL. When the CE terminal is at low level, the output from this terminal is at high level. 
19	X2	Connecting terminal for crystal oscillator. The crystal connected is at 4.5 MHz.
20	X1	
21	VDD	Power supply terminal of the device.

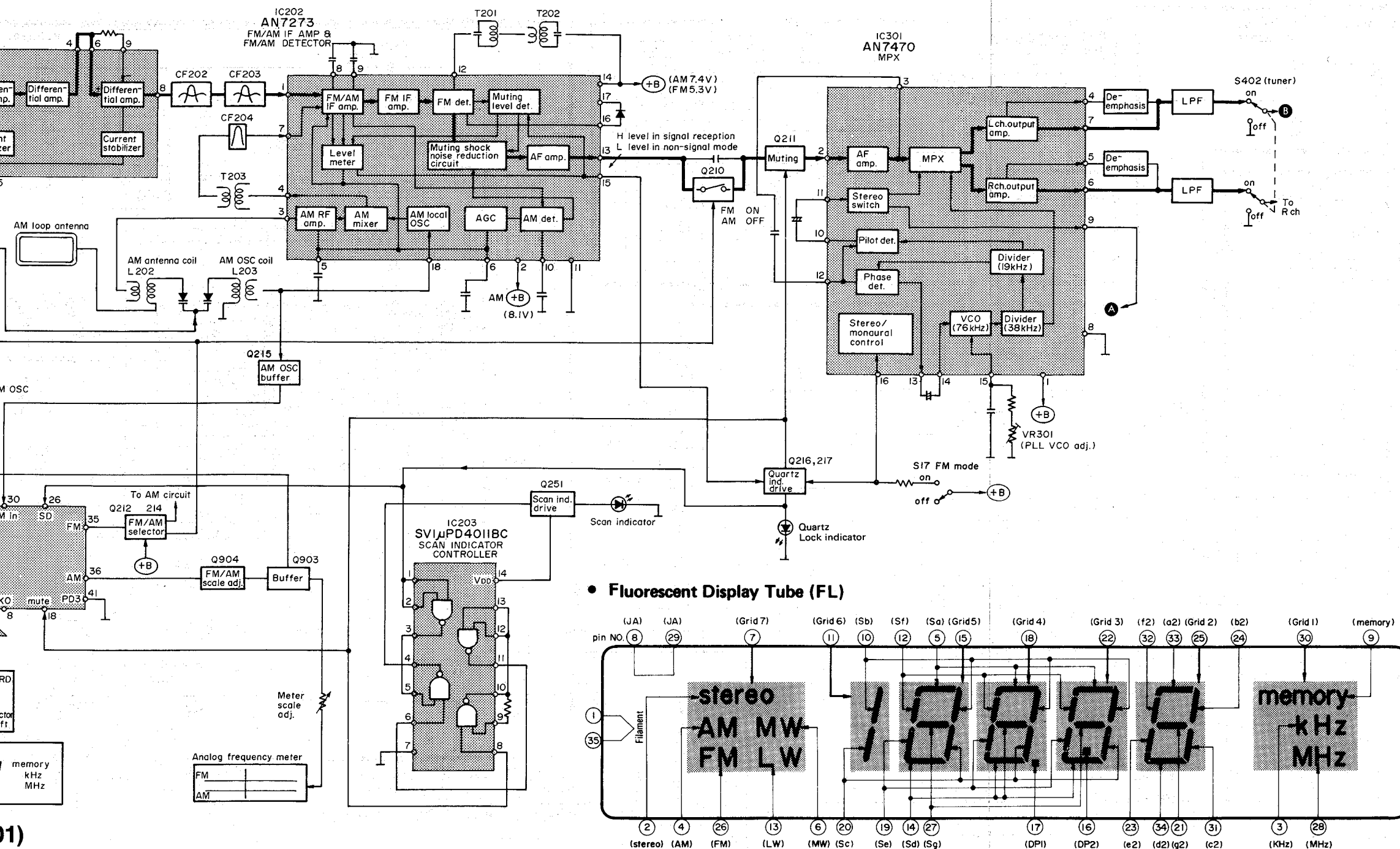
Pin No.	Mark	Description of terminal
22	E01	When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (0V) output is delivered. When they coincide, it results in floating.
23	GND	Ground terminal.
24	E02	Not used in this unit.
25	CE	This is the selected signal input terminal of the device. When operating the device, make the level high, and when it is not used, make the level low. When this terminal is at low level, all the segment (a ~ g) and digits (D1 ~ D6) terminals are off, but the memory is held.

Pin No.	Mark	Description of terminal
		Power "ON" Power "OFF"  The device does not operate during this period.
26	SD	This input terminal detects the reception of a broadcasting station. The voltage is 4.2V during reception, and otherwise 0V.
27	FM	Input terminal for FM OSC output frequency-divided to 1/16 or 1/17 by pre-scaler.

Pin No.	Mark	Description of terminal
28	PSC	This is the terminal to deliver the frequency dividing ratio changeover output signal to the pre-scaler. The terminal continues to produce pulses at the rise of the signal applied to FM terminal (27) until the content of the inside swallow counter is 0. When the swallow counter comes to 0, the terminal level becomes low, then the frequency dividing ratio of pre-scaler is 1/16.  Pulse two times larger than the value that cannot be divided by VCO/16.
29	INT	This is the interrupt demand signal input terminal. The signal from the control input terminal is put into this terminal, demanding for interruption, then the flow of program will be unconditionally shifted to the address No. 1.
30	AM	Input terminal for AM OSC output. 
31	PC2	This is 2-bit input/output port. PC2 terminal (31) is the decimal indication output terminal for the digital display.
32	PC3	
33	PB0	This is 4-bit input/output port. PB2 terminal (35) is the FM/AM changeover output terminal, which is 5V in FM, and 0V in AM. Other terminals are not used in this unit.
34	PB1	
35	PB2	
36	PB3	This is 4-bit input/output port. (Not used in this unit)
37	PA0	
38	PA1	
39	PA2	
40	PA3	
41	PD3	One-bit input/output port. (Not used in this unit.)
42	VDP	One-bit output port. Output signal is emitted to operate the analog frequency meter, and the output voltage varies according to the frequency.



[Fig. 31]



Pin No.	Mark	Description of terminal
28	PSC	This is the terminal to deliver the frequency dividing ratio changeover output signal to the pre-scaler. The terminal continues to produce pulses at the rise of the signal applied to FM terminal (27) until the content of the inside swallow counter is 0. When the swallow counter comes to 0, the terminal level becomes low, then the frequency dividing ratio of pre-scaler is 1/16. Pulse two times larger than the value that cannot be divided by VCO/16.
29	INT	This is the interrupt demand signal input terminal. The signal from the control input terminal is put into this terminal, demanding for interruption, then the flow of program will be unconditionally shifted to the address No. 1.
30	AM	Input terminal for AM OSC output.
31	PC2	This is 2-bit input/output port. PC2 terminal (31) is the decimal indication output terminal for the digital display.
32	PC3	
33	PB0	
34	PB1	
35	PB2	This is 4-bit input/output port. PB2 terminal (35) is the FM/AM changeover output terminal, which is 5V in FM, and 0V in AM. Other terminals are not used in this unit.
36	PB3	
37	PA0	
38	PA1	This is 4-bit input/output port. (Not used in this unit)
39	PA2	
40	PA3	One-bit input/output port. (Not used in this unit.)
41	PD3	
42	VDP	One-bit output port. Output signal is emitted to operate the analog frequency meter, and the output voltage varies according to the frequency.

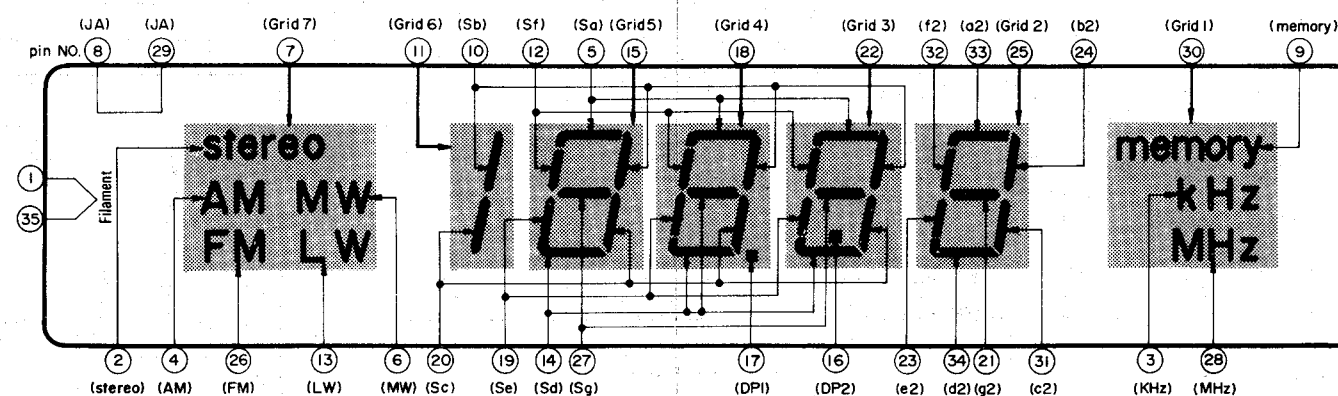
01)

terminal for key return signal from key matrix. The output of segment (a ~ g) is used as the key return source.

al output terminal for display. (Fig. 31)

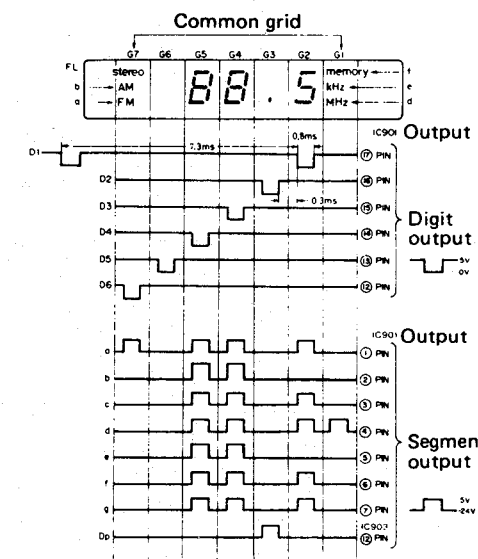
Pin No.	Mark	Description of terminal
18	MT	This is the output terminal to eliminate shock noise due to unlocking at PLL. When the CE terminal is at low level, the output from this terminal is at high level.
19	X2	Connecting terminal for crystal oscillator. The crystal connected is at 4.5 MHz.
20	X1	
21	VDD	Power supply terminal of the device.

Fluorescent Display Tube (FL)



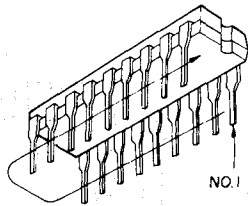
Pin No.	Mark	Description of terminal
22	E01	When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (0V) output is delivered. When they coincide, it results in floating.
23	GND	Ground terminal.
24	E02	Not used in this unit.
25	CE	This is the selected signal input terminal of the device. When operating the device, make the level high, and when it is not used, make the level low. When this terminal is at low level, all the segment (a ~ g) and digits (D1 ~ D6) terminals are off, but the memory is held.

Pin No.	Mark	Description of terminal
		Power "ON" Power "OFF"
26	SD	This input terminal detects the reception of a broadcasting station. The voltage is 4.2V during reception, and otherwise 0V.
27	FM	Input terminal for FM OSC output frequency-divided to 1/16 or 1/17 by pre-scaler.



[Fig. 31]

• Terminal guide of transistors, diodes and IC's

		AN6558F SVIUPB553C-E AN7062 AN7273A AN6873N AN7470 MN1421STA SVIUPD4011BC	8 pin 18 pin 16 pin 28 pin 14 pin
AN278		SVISTK2048-2	
SVID1704C525		SVINJ4559DSM	
2SD1265		2SA1123, 2SC1685 2SA564A, 2SC2631 2SC1383NC, 2SC1684 2SA992, 2SC945	
MA162A		SVDKV1236Z	
SVDMC921		MA150, MA27WA	
LN446YP		LN846RP	
LN0603YP4		SVDMC911	
SVDMA26-2		MA1062M, MA1270M, MA1160L	
LN0202GP6 LN0202YP4		SVDS3V20	

RESISTORS & CAPACITORS

- Notes:**
- Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
 - Important safety notice:
Components identified by Δ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

Resistor Type	Wattage	Tolerance
ERD : Carbon	10 : 1/8W	G : $\pm 2\%$
ERG : Metal Oxide	25 : 1/4W	J : $\pm 5\%$
ERO : Metal Film	1 : 1W	K : $\pm 10\%$
ERQ : Fuse Type Metal	2 : 2W	
	S1 : 1/2W	

ERD10TLJ $\square\square\square$ $\rightarrow$ Chip type carbon
ERO10MKG $\square\square\square$ $\rightarrow$ Chip type metal film

- The $\textcircled{S}$ mark is service standard parts and may differ from production parts.
- The unit of resistance is OHM (Ω).
K = 1000 Ω , M = 1000K Ω
- The unit of capacitance is MICROFARAD (μF)
P = 10^{-6} μF

Numbering System of Resistor

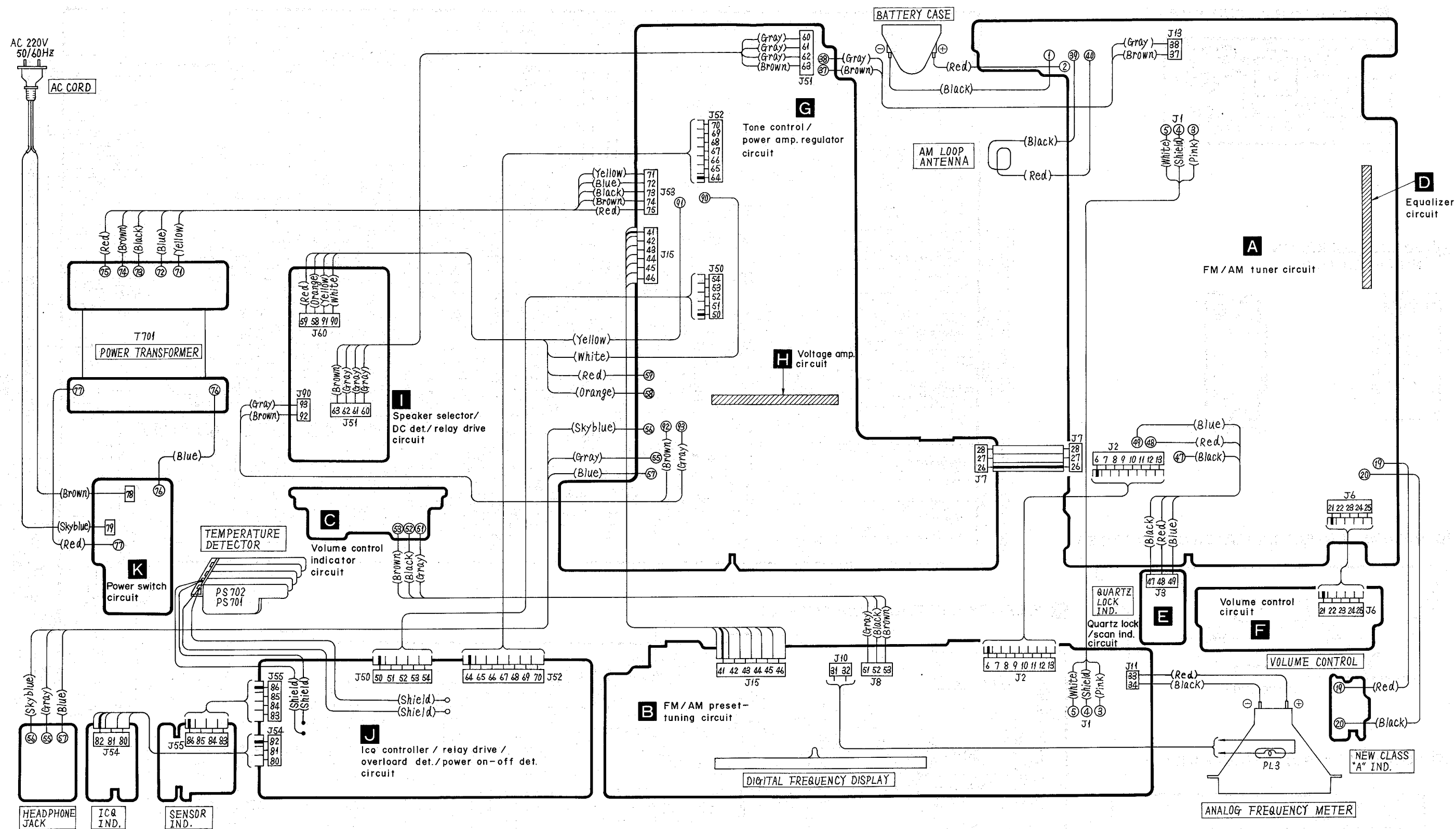
Example

Type	Wattage	Shape	Tolerance	Value
ERD	25	F	J	101
ERX	2	AN	J	2R2

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
RESISTORS											
R1,2	ERD10TLJ391U	390	R241	$\textcircled{S}$ ERD25TJ333	33K	R605,606	$\textcircled{S}$ ERO25CKF124	120K	R730	$\textcircled{S}$ ERD25FJ103	10K
R3,4	ERO10MKG2213	221K	R242	$\textcircled{S}$ ERD25TJ274	270K	R607,608	$\textcircled{S}$ ERD25FJ562	5.6K	R731,732	Δ ERD25FJ331	330
R5,6	ERO10MKG5622	56.2K	R243	$\textcircled{S}$ ERD25FJ271	270	R609,610	$\textcircled{S}$ ERD25FJ102	1K	R733,734	$\textcircled{S}$ ERD25FJ272	2.7K
R7,8	ERD10TLJ271U	270	R244	$\textcircled{S}$ ERD25FJ101	100	R611,612	$\textcircled{S}$ ERD25TJ563	56K	R735,736	$\textcircled{S}$ ERD25FJ103	10K
R9,10	ERD10TLJ680U	68	R245	$\textcircled{S}$ ERD25TJ104	100K	R613,614	Δ ERD25FJ102	1K	R738,738	$\textcircled{S}$ ERD25TJ683	68K
R11,12	ERD10TLJ184U	180K	R246	$\textcircled{S}$ ERD25TJ684	680K	R615,616	$\textcircled{S}$ ERD25FJ222	2.2K	R739	$\textcircled{S}$ ERD25TJ333	33K
R13,14	ERD10TLJ123U	12K	R247	$\textcircled{S}$ ERD25FJ331	330	R617,618	Δ ERD25FJ561	560	R740	$\textcircled{S}$ ERD25TJ183	18K
R15,16	ERD10TLJ563U	56K	R248	$\textcircled{S}$ ERD25FJ682	6.8K	R619,620	$\textcircled{S}$ ERD25TJ473	47K	R741	$\textcircled{S}$ ERD25TJ333	33K
R17,18	ERD10TLJ102U	1K	R249	$\textcircled{S}$ ERD25FJ821	820	R621,622	Δ ERD25FJ820	82	R742,743	$\textcircled{S}$ ERD25FJ103	10K
R19,20	ERD10TLJ334U	330K	R250	$\textcircled{S}$ ERD25FJ821	820				R744,745	$\textcircled{S}$ ERD25FJ103	10K
R21	$\textcircled{S}$ ERD25FJ331	330	R251	$\textcircled{S}$ ERD25TJ104	100K	R623,624	$\textcircled{S}$ ERD25FJ101	100			
R22	$\textcircled{S}$ ERD25FJ471	470	R252	$\textcircled{S}$ ERD25TJ473	47K	R625,626	$\textcircled{S}$ ERD25TJ154	150K	R746	$\textcircled{S}$ ERD25TJ223	22K
R23	$\textcircled{S}$ ERD25FJ221	220	R253	$\textcircled{S}$ ERD25TJ224	220K	R627,628	$\textcircled{S}$ ERD25TJ154	150K	R747,748	$\textcircled{S}$ ERD25FJ121	120
R24	$\textcircled{S}$ ERD25FJ102	1K	R254	$\textcircled{S}$ ERD25TJ333	33K	R629,630	Δ ERD25FJ102	1K	R749,750	$\textcircled{S}$ ERD25FJ103	10K
R25	$\textcircled{S}$ ERD25FJ471	470	R255	$\textcircled{S}$ ERD25FJ151	150	R631,632	$\textcircled{S}$ ERD25FJ102	1K	R751,752	$\textcircled{S}$ ERD25FJ103	10K
R26	$\textcircled{S}$ ERD25FJ682	6.8K	R256	$\textcircled{S}$ ERD25FJ151	150	R633,634	$\textcircled{S}$ ERD25FJ103	10K	R753	$\textcircled{S}$ ERD25TJ333	33K
R27	$\textcircled{S}$ ERD25FJ272	2.7K	R301	$\textcircled{S}$ ERD25FJ151	150	R635,636	Δ ERD25FJ100	10	R755,756	$\textcircled{S}$ ERD25FJ181	180
R28	$\textcircled{S}$ ERD25FJ103	10K	R302	$\textcircled{S}$ ERD25TJ104	100K	R639,640	$\textcircled{S}$ ERG1ANJ331	330	R757	$\textcircled{S}$ ERD25FJ181	180
R29	$\textcircled{S}$ ERD25TJ684	680K	R303	$\textcircled{S}$ ERD25TJ273	27K	R641	Δ ERD25FJ470	47	R758	$\textcircled{S}$ ERD25FJ222	2.2K
R30	$\textcircled{S}$ ERD25TJ104	100K	R304	$\textcircled{S}$ ERD25TJ223	22K	R642	$\textcircled{S}$ ERD25FJ103	10K	R761,762	$\textcircled{S}$ ERD25TJ223	22K
R31	$\textcircled{S}$ ERD25FJ102	1K	R305,306	$\textcircled{S}$ ERD25FJ332	3.3K				R763,764	$\textcircled{S}$ ERD25TJ223	22K
R32	$\textcircled{S}$ ERD25FJ562	5.6K	R307,308	$\textcircled{S}$ ERD25FJ332	3.3K	R702	Δ ERQ2AJP330	33			
R33	$\textcircled{S}$ ERD25FJ152	1.5K	R309,310	$\textcircled{S}$ ERD25TJ104	100K	R703	Δ ERD25FJ152	1.5K	R765	$\textcircled{S}$ ERD25FJ102	1K
R34	$\textcircled{S}$ ERD25FJ681	680	R311	$\textcircled{S}$ ERD25FJ392	3.9K	R704	$\textcircled{S}$ ERD25FJ821	820	R767	$\textcircled{S}$ ERD25TJ334	330K
R35	$\textcircled{S}$ ERD25FJ103	10K	R312	$\textcircled{S}$ ERD25TJ153	15K	R705	$\textcircled{S}$ ERD25FJ681	680	R770	$\textcircled{S}$ ERG2ANJ561	560
R36	$\textcircled{S}$ ERD25TJ104	100K	R313	$\textcircled{S}$ ERD25FJ103	10K	R706	$\textcircled{S}$ ERD25FJ272	2.7K	R771,772	$\textcircled{S}$ ERD25FJ103	10K
R37	$\textcircled{S}$ ERD25FJ102	1K	R314	$\textcircled{S}$ ERD25FJ102	1K	R707	$\textcircled{S}$ ERD25FJ222	2.2K	R773,774	$\textcircled{S}$ ERD25FJ472	4.7K
R38	$\textcircled{S}$ ERD25FJ562	5.6K	R315	$\textcircled{S}$ ERD25TJ184	180K	R708	$\textcircled{S}$ ERG1ANJ470	47	R780	$\textcircled{S}$ ERD25FJ822	8.2K
R39	$\textcircled{S}$ ERD25FJ152	1.5K	R401,402	$\textcircled{S}$ ERD25FJ222	2.2K	R709	Δ ERD25FJ122	1.2K	R901	$\textcircled{S}$ ERD25FJ102	1K
R40	$\textcircled{S}$ ERD25FJ681	680	R403,404	$\textcircled{S}$ ERD25TJ183	18K	R710	$\textcircled{S}$ ERG1ANJ102	1K	R902	$\textcircled{S}$ ERD25FJ561	560
R41	$\textcircled{S}$ ERD25FJ103	10K	R405,406	$\textcircled{S}$ ERD25TJ393	39K	R711	$\textcircled{S}$ ERD25FJ221	220	R903	$\textcircled{S}$ ERD25FJ682	6.8K
R42	$\textcircled{S}$ ERD25TJ104	100K	R407	$\textcircled{S}$ ERD25FJ151	150				R904	$\textcircled{S}$ ERD25FJ562	5.6K
R43	$\textcircled{S}$ ERD25FJ392	3.9K	R501,502	$\textcircled{S}$ ERD25FJ392	3.9K	R713,714	$\textcircled{S}$ ERD25FJ103	10K	R905	$\textcircled{S}$ ERD25FJ101	100
R44	$\textcircled{S}$ ERD25FJ102	1K	R503,504	$\textcircled{S}$ ERD25FJ102	1K	R715,716	$\textcircled{S}$ ERD25FJ103	10K	R906	$\textcircled{S}$ ERD25FJ151	150
R45	$\textcircled{S}$ ERD25TJ223	22K	R505,506	$\textcircled{S}$ ERD25TJ223	22K	R717,718	$\textcircled{S}$ ERD25FJ103	10K	R907	$\textcircled{S}$ ERD25FJ103	10K
R46	$\textcircled{S}$ ERD25FJ332	3.3K	R507,508	$\textcircled{S}$ ERD25FJ332	3.3K	R719	$\textcircled{S}$ ERD25FJ272	2.7K	R908	$\textcircled{S}$ ERD25TJ273	27K
R47	$\textcircled{S}$ ERD25TJ474	470K	R513,514	$\textcircled{S}$ ERD25TJ474	470K	R720	$\textcircled{S}$ ERD25TJ223	22K	R909	Δ ERD25FJ680	68
R48	$\textcircled{S}$ ERD25TJ474	470K	R515,516	$\textcircled{S}$ ERD25TJ474	470K	R721	$\textcircled{S}$ ERD25FJ472	4.7K	R910	$\textcircled{S}$ ERD25FJ681	680
R49	$\textcircled{S}$ ERD25TJ393	39K	R517,518	$\textcircled{S}$ ERD25TJ393	39K	R722	$\textcircled{S}$ ERD25TJ153	15K	R911	$\textcircled{S}$ ERD25FJ103	10K
R50	$\textcircled{S}$ ERD25TJ473	47K	R601	$\textcircled{S}$ ERD25TJ473	47K	R723	$\textcircled{S}$ ERD25FJ822	8.2K	R912	$\textcircled{S}$ ERD25TJ224	220K
R51	$\textcircled{S}$ ERD25FJ103	10K	R602	Δ $\textcircled{S}$ ERD25FJ470	47	R724	$\textcircled{S}$ ERD25FJ562	5.6K	R914	$\textcircled{S}$ ERD25TJ104	100K
R52	$\textcircled{S}$ ERD25FJ561	560				R725,726	$\textcircled{S}$ ERD25FJ103	10K			
R53	$\textcircled{S}$ ERD25TJ104	100K									

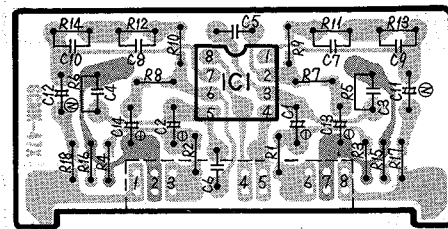
Continued on page 39

CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

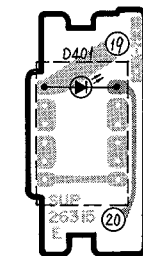
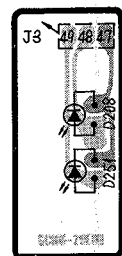


PRINTED CIRCUIT BOARDS

D (EQUALIZER CIRCUIT P.C.B.)

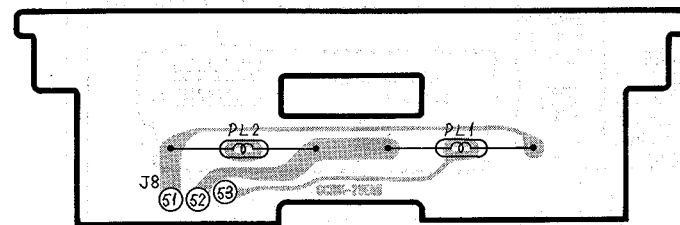


E (QUARTZ LOCK/SCAN INDICATOR P.C.B.)



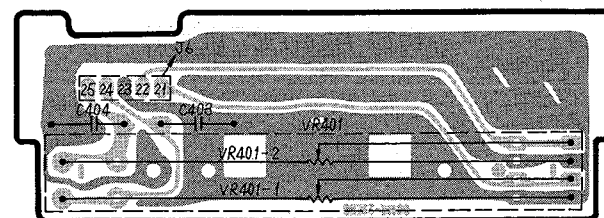
(NEW CLASS A IND.)

C (VOLUME CONTROL INDICATOR CIRCUIT P.C.B.)



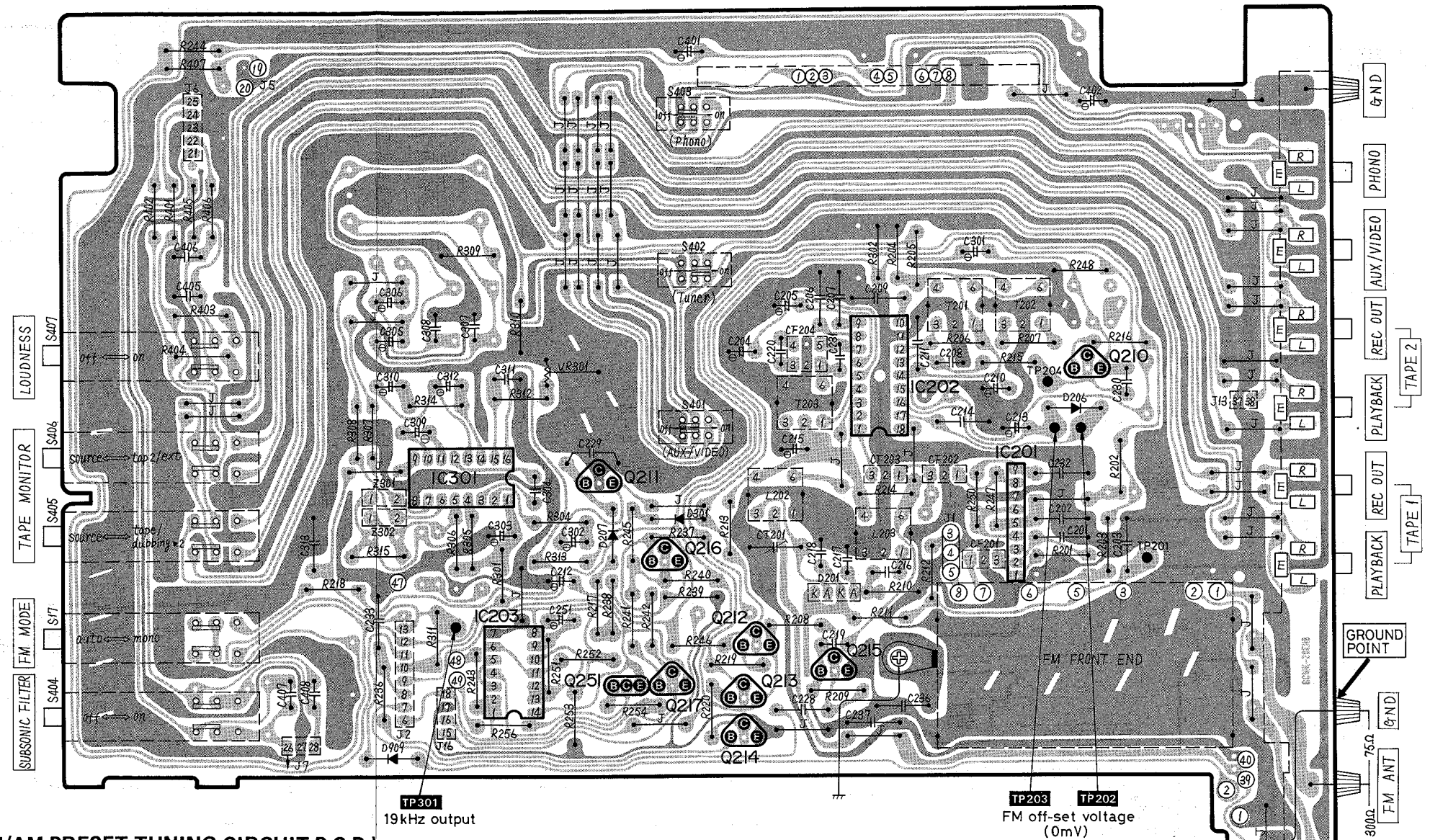
(VOLUME LAMP)

F (VOLUME CONTROL CIRCUIT P.C.B.)

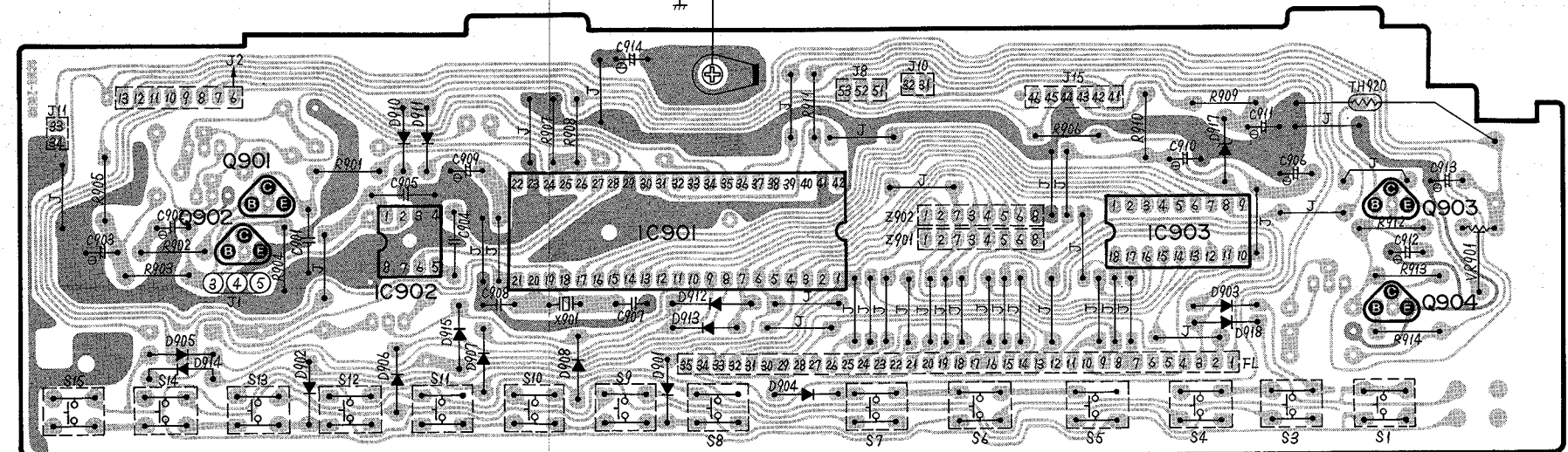


VOLUME

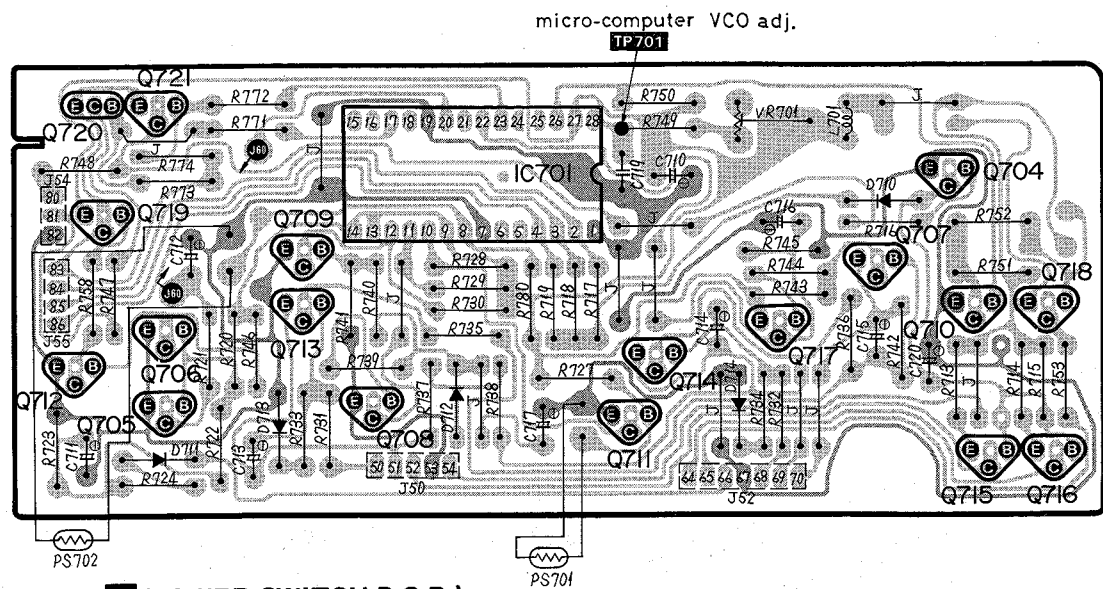
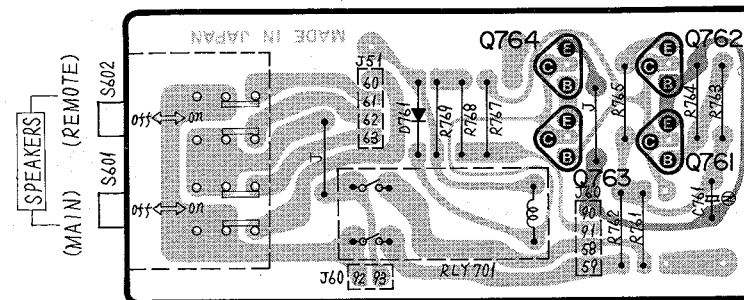
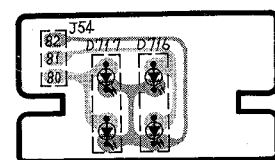
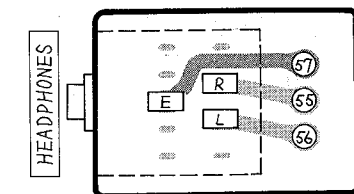
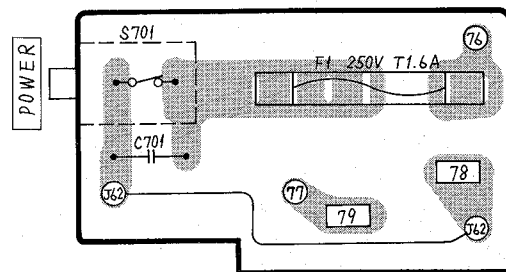
A (FM/AM TUNER CIRCUIT P.C.B.)



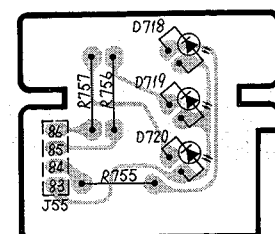
B (FM/AM PRESET-TUNING CIRCUIT P.C.B.)



(CH8-CH16) (CH7-CH15) (CH6-CH14) (CH5-CH13) (CH4-CH12) (CH3-CH11) (CH2-CH10) (CH1-CH9) (MEMORY) (UP) (DOWN) TUNING FM AM SHIFT

J (IcQ CONTROLLER/RELAY DRIVE/OVER LOAD DET./POWER ON-OFF DET. CIRCUIT P.C.B.)**I** (SPEAKER SELECTOR/DC DET./RELAY DRIVE CIRCUIT P.C.B.)**G** (TONE CONTROL/POWER AMP. REGULATOR CIRCUIT P.C.B.)**K** (POWER SWITCH P.C.B.)

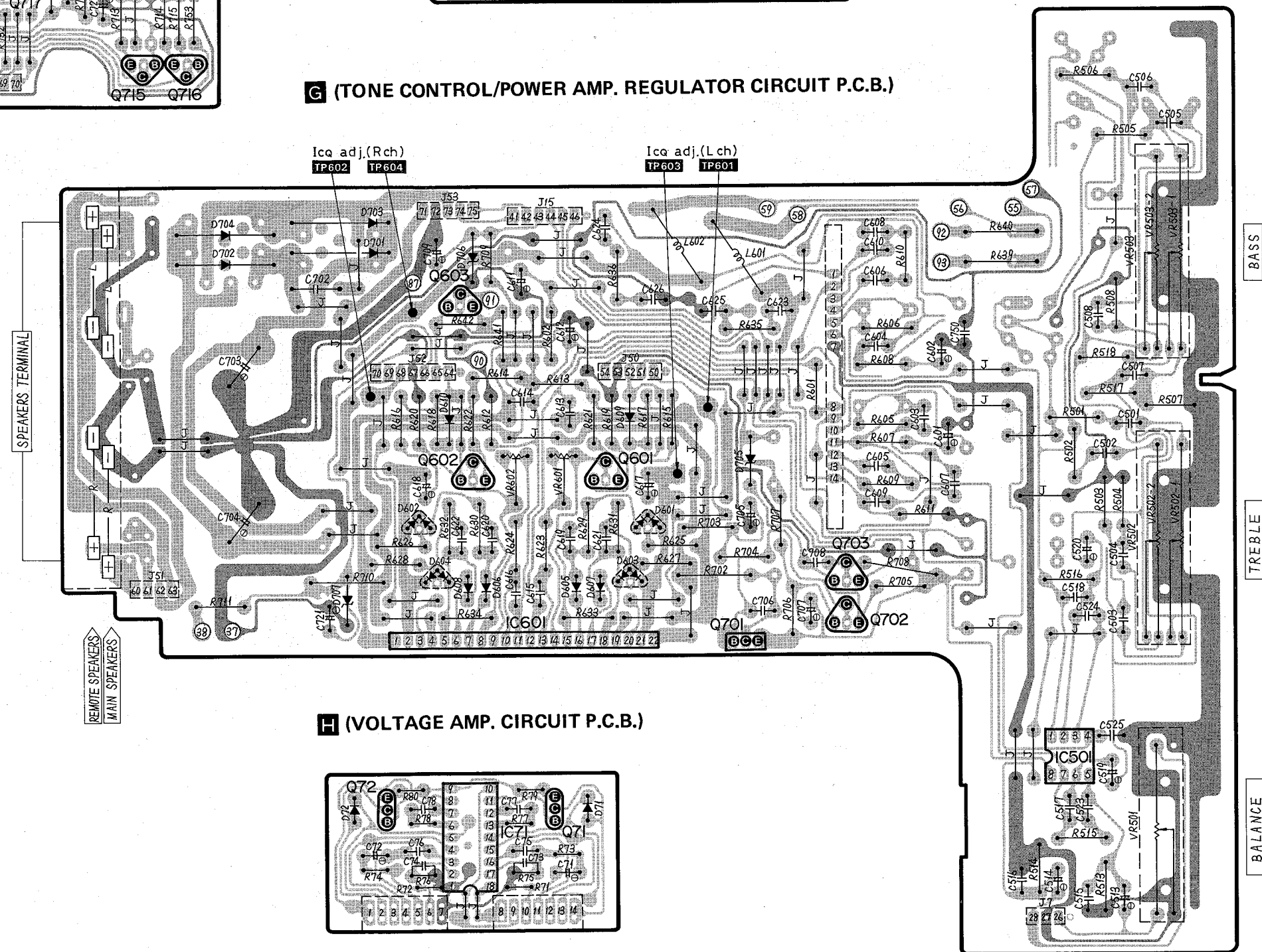
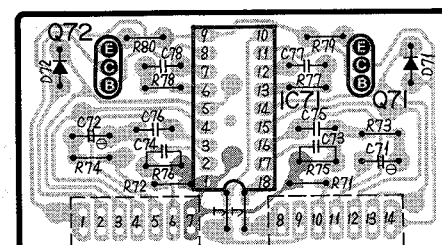
(PRE-HEAT IND.) (AUTO IND.)



(LOW IND.)

(HIGH IND.)

(THERMAL IND.)

H (VOLTAGE AMP. CIRCUIT P.C.B.)

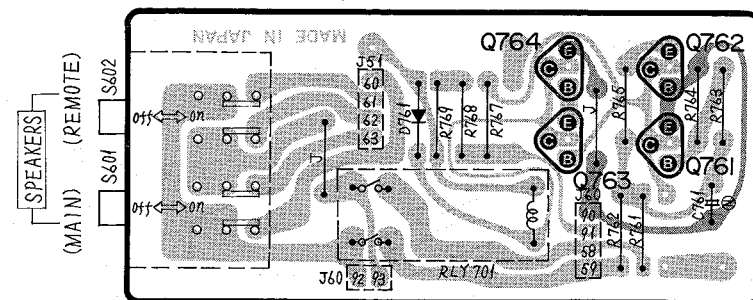
Capacitor Type

ECEA	: Electrolytic
ECEA.....N	: Non Polar E
ECCD	: Ceramic
ECKD	: Ceramic
EQCM	: Polyester
ECQP	: Polypropyl
ECET	: Electrolytic
ECBT	: Ceramic

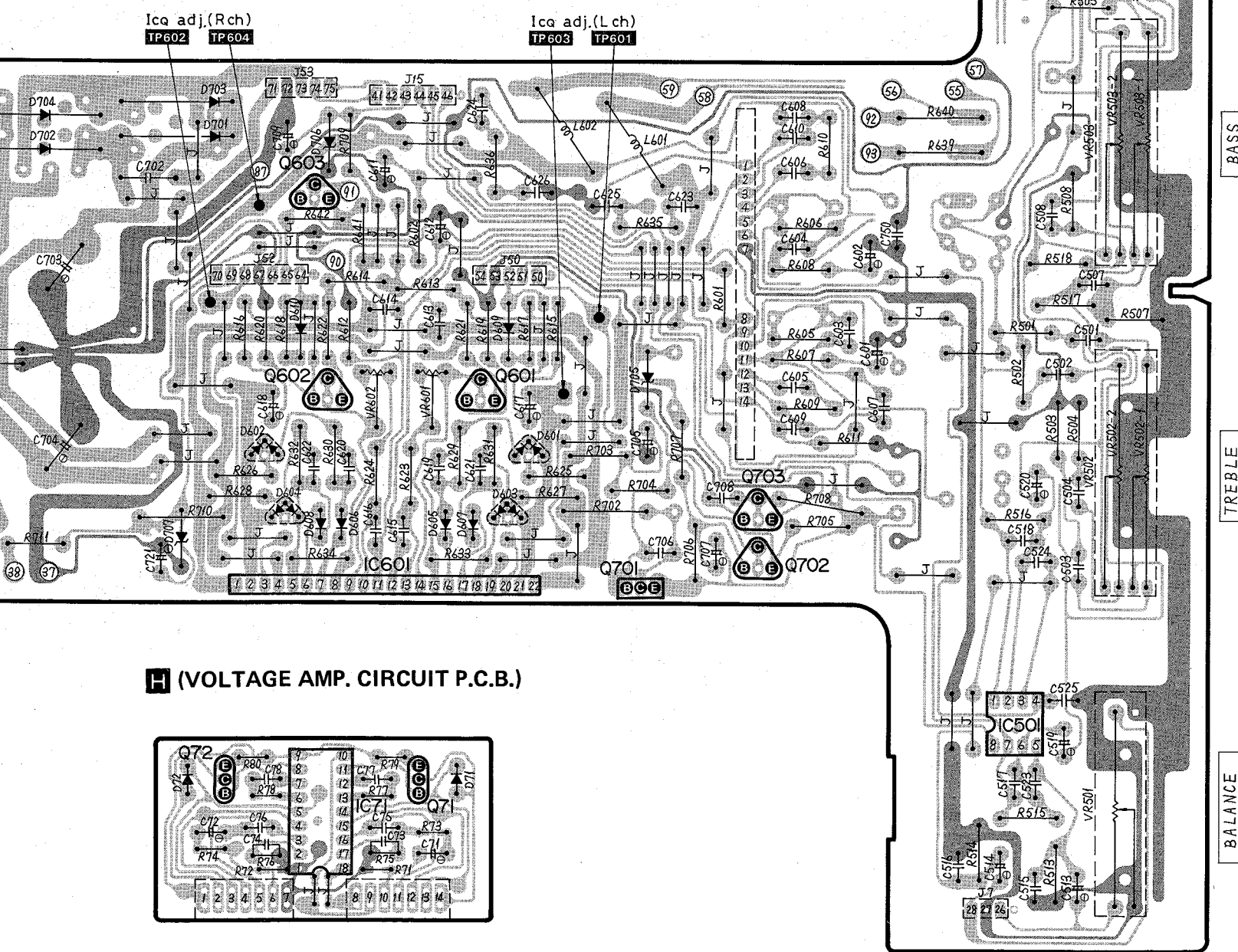
Ref. No.	Part No.
CAPASITORS	
C1,2	Ⓢ ECEA50M3R
C3,4	Ⓢ ECCD1H101
C5,6	Ⓢ ECKD1H471
C7,8	Ⓢ EQCM1H223
C9,10	Ⓢ EQCM1H682
C11,12	Ⓢ ECEA1HN01
C13,14	Ⓢ ECEA1CS33
C71,72	Ⓢ ECEA50Z3R
C73,74	Ⓢ ECCD1H390
C75,76	Ⓢ ECCD1H820
C77,78	Ⓢ ECKD1H391
C201	Ⓢ ECBT1C103
C202,203	Ⓢ ECBT1C223
C204	Ⓢ ECEA1AS10
C205	Ⓢ ECEA50Z3R
C206	Ⓢ ECBT1C103
C207	Ⓢ ECBT1C223
C208	Ⓢ ECCD1H470
C209	Ⓢ ECBT1C223
C210	Ⓢ ECEA1HS10
C211	Ⓢ ECBT1C103
C212	Ⓢ ECEA50Z4R
C213	Ⓢ ECEA50Z1
C214	Ⓢ ECBT1C103
C215	Ⓢ ECEA1HS10
C216	Ⓢ ECQP1471J
C217	Ⓢ ECCD1H10C
C218	Ⓢ EQCM1H47

ET. CIRCUIT P.C.B.)

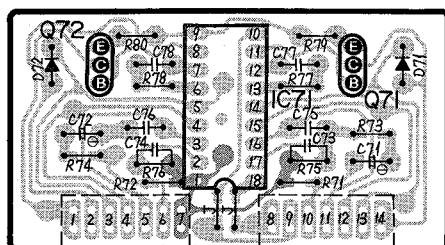
I (SPEAKER SELECTOR/DC DET./RELAY DRIVE CIRCUIT P.C.B.)



G (TONE CONTROL/POWER AMP. REGULATOR CIRCUIT P.C.B.)



H (VOLTAGE AMP. CIRCUIT P.C.B.)



Continued from page 32

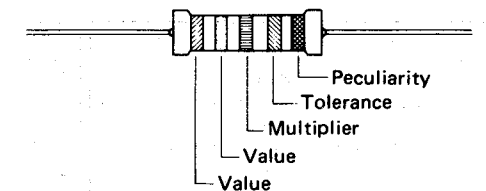
Capacitor Type	Voltage		Tolerance
	ECEA ECBT Type ECET	Others	
ECEA	: Electrolytic	OJ : 6.3V	C : $\pm 0.25\text{pF}$
ECEA.....N	: Non Polar Electrolytic	1A : 10V	J : $\pm 5\%$
ECCD	: Ceramic	1C : 16V	K : $\pm 10\%$
ECKD	: Ceramic	1E : 25V	Z : $+80\%, -20\%$
ECQM	: Polyester	1H : 50V	P : $+100\%, -0\%$
ECQP	: Polypropylene	50 : 50V	
ECET	: Electrolytic	25 : 25V	
ECBT	: Ceramic	1V : 35V	

Numbering System of Capacitor

Example

ECKD	1H	102	M	D
Type	Voltage	Value	Tolerance	Peculiarity
ECEA	50	M	R47	R
Type	Voltage	Peculiarity use	Value	Special use

★ ECB type capacitor



Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
CAPASITORS											
C1,2	Ⓢ ECEA50M3R3R	3.3	C219	Ⓢ ECCD1H180KC	18P	C503,504	Ⓢ ECQM1H333JZ	0.033	C707	Ⓢ ECEA1HS100	10
C3,4	Ⓢ ECCD1H101K	100P	C220	Ⓢ ECCD1H470K	47P	C505,506	Ⓢ ECQM1H183JZ	0.018	C708	Ⓢ ECKD1H103ZF	0.01
C5,6	Ⓢ ECKD1H471KB	470P				C507,508	Ⓢ ECQM1H104JZ	0.1	C709	Ⓢ ECEA1VS330	33
C7,8	Ⓢ ECQM1H223JZ	0.022	C228	Ⓢ ECBT1C103ZYY	0.01	C513,514	Ⓢ ECEA50Z3R3	3.3	C710	Ⓢ ECEA0JS471	470
C9,10	Ⓢ ECQM1H682JZ	0.0068	C229	Ⓢ ECBT1C223NYY	0.022	C515,516	Ⓢ ECCD1H101K	100P	C711	Ⓢ ECEA25Z4R7	4.7
C11,12	Ⓢ ECEA1HN010S	1	C230	Ⓢ ECQM1H183JZ	0.018	C517,518	Ⓢ ECCD1H390K	39P	C712	Ⓢ ECEA50Z3R3	3.3
C13,14	Ⓢ ECEA1CS330	33	C231	Ⓢ ECCD1H080CC	8P	C519,520	Ⓢ ECEA50Z1	1	C713,714	Ⓢ ECEA50Z1	1
C17,72	Ⓢ ECEA50Z3R3	3.3	C232,233	Ⓢ ECBT1C103ZYY	0.01				C715	Ⓢ ECEA50Z3R3	3.3
C73,74	Ⓢ ECCD1H390K	39P	C236	Ⓢ ECBT1C223NYY	0.022	C523,524	Ⓢ ECCD1H101K	100P	C716	Ⓢ ECEA25Z4R7	4.7
C75,76	Ⓢ ECCD1H820K	82P	C237	Ⓢ ECBT1C103ZYY	0.01	C525	Ⓢ ECKD1H473ZF	0.047			
						C601,602	Ⓢ ECEA1HS100	10	C717	Ⓢ ECEA50Z3R3	3.3
C77,78	Ⓢ ECKD1H391KB	390P	C251	Ⓢ ECEA50Z1	1	C603,604	Ⓢ ECCD1H070CC	7P	C719	Ⓢ ECCD1H151K	150P
C201	Ⓢ ECBT1C103ZYY	0.01	C301	Ⓢ ECEA50Z2R2	2.2	C605,606	Ⓢ ECKD1H821KB	820P	C720	Ⓢ ECEA1CS330	33
C202,203	Ⓢ ECBT1C223NYY	0.022	C302	Ⓢ ECEA25Z4R7	4.7	C607,608	Ⓢ ECCD1H220K	22P	C721	Ⓢ ECEA1HS100	10
C204	Ⓢ ECEA1AS101	100	C303	Ⓢ ECEA1ES101	100	C609,610	Ⓢ ECCD1H390K	39P	C750	Ⓢ ECKD1H223ZF	0.022
C205	Ⓢ ECEA50Z3R3	3.3	C304	Ⓢ ECQM1H473JZ	0.047	C611	Ⓢ ECEA1HS101	100	C761	Ⓢ ECEA1CN221S	220
C206	Ⓢ ECBT1C103ZYY	0.01	C305,306	Ⓢ ECEA50Z47	0.47	C612	Ⓢ ECEA50Z1	1	C901	Ⓢ ECBT1C103ZYY	0.01
C207	Ⓢ ECBT1C223NYY	0.022				C613,614	Ⓢ ECCD1H101K	100P	C902	Ⓢ ECEA25M4R7R	4.7
C208	Ⓢ ECCD1H470K	47P							C903	Ⓢ ECEA1HS100	10
C209	Ⓢ ECBT1C223NYY	0.022							C904,905	Ⓢ ECBT1C103ZYY	0.01
C210	Ⓢ ECEA1HS100	10									
C211	Ⓢ ECBT1C103ZYY	0.01	C307,308	Ⓢ ECQM1H153JZ	0.015						
C212	Ⓢ ECEA50Z47	0.47	C309	Ⓢ ECEA50Z1	1	C615,616	Ⓢ ECKD1H103ZF	0.01			
C213	Ⓢ ECEA50Z1	1	C310	Ⓢ ECEA50Z3R3	3.3	C617,618	Ⓢ ECEA50Z3R3	3.3			
C214	Ⓢ ECBT1C103ZYY	0.01	C311	Ⓢ ECQP1471JZ	470P	C619,620	Ⓢ ECKD1H681KB	680P			
C215	Ⓢ ECEA1HS100	10	C312	Ⓢ ECEA50Z1	1	C621,622	Ⓢ ECKD1H681KB	680P			
C216	Ⓢ ECQP1471JZ	470P	C313	Ⓢ ECBT1C103ZYY	0.01	C623,624	Ⓢ ECQM1H104JZ	0.1			
C217	Ⓢ ECCD1H100KC	10P	C401,402	Ⓢ ECEA1HS100	10	C625,626	Ⓢ ECQM1H104JZ	0.1			
C218	Ⓢ ECQM1H473JZ	0.047	C403,404	Ⓢ ECBT1H331KBY	330P	C701	Ⓢ ECKDKC103PF2	0.01			
			C405,406	Ⓢ ECQM1H563JZ	0.056	C702	Ⓢ ECQE1104JZ	0.1			
						C703,704	Ⓢ ECETS1HV822U	8200			
			C407	Ⓢ ECQM1H124JZ	0.12	C705	Ⓢ ECEA1ES101	100			
			C408	Ⓢ ECQM1H124JZ	0.12						
			C501,502	Ⓢ ECQM1H332JZ	0.0033	C706	Ⓢ ECKD1H103ZF	0.01			

REPLACEMENT PARTS LIST...Cabinet and Chassis Parts

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by Δ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. The $\textcircled{S}$ mark is service standard parts and may differ from production parts.

4. Bracketed indications in Ref. No. columns specify the area.
5. The parenthesized number in the column of description stand for the quantity per set.
6. $\textcircled{K}$ -marked parts are used for black only, while $\textcircled{O}$ -marked parts are for silver type only.
7. Part other than $\textcircled{K}$ - and $\textcircled{O}$ -marked are used for both black and silver type.

Black type model No. SA-410 (K)

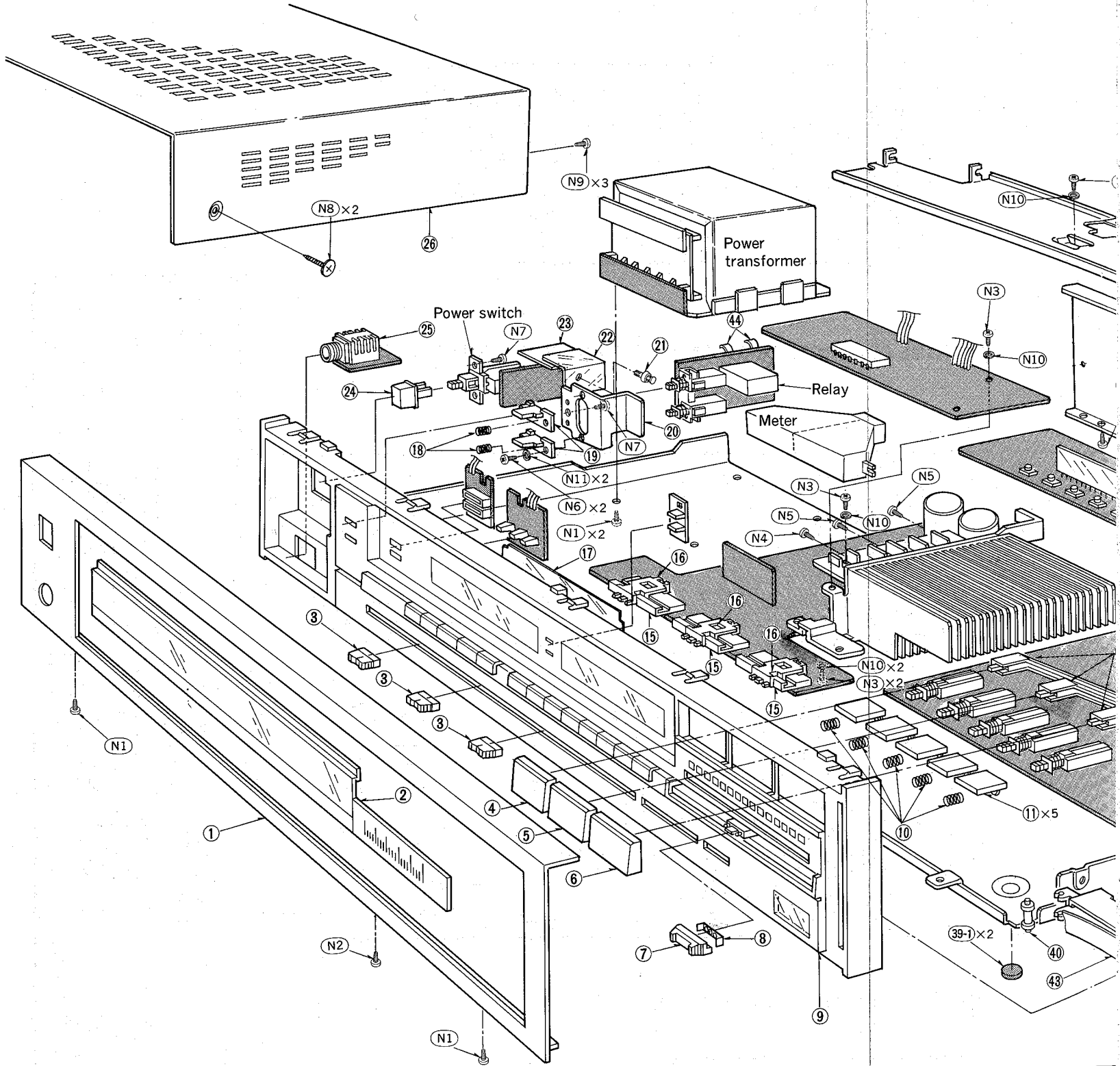
Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
CABINET and CHASSIS PARTS			17	SDU89-1	Filter,FL	SCREWS		
1	○ SGWA410M	Front Panel,Ass'y (Silver)	18	SUS257	Spring	N1	XTBS3+8BFYR1	Tapping with Detent, ⊕3×8
1	⊗ SGWA410KE	Front Panel,Ass'y (Black)	19	○ SBC483-2	Button,Speaker Selector(Silver)	N2	XTBS3+8BFZ1	Tapping with Detent, ⊕3×8
2	○ SGU319SK	Transparent Panel (Silver Type)	19	⊗ SBC483-4	Button,Speaker Selector(Black)	N3	⊗ XTN3+8B	Tapping,⊕3×8
2	⊗ SGU319BK	Transparent Panel (Black Type)	20	SMN1857	Bracket,Power Switch	N4	⊗ XTB3+8BFZ	Tapping,⊕3×8
3	○ SBD69-2M	Knob,Balance,Bass and Treble(Silver)	21	SHR411	Lock Pin	N5	XTB3+14BFZ	Tapping,⊕3×14
3	⊗ SBD69-1M	Knob,Balance,Bass and Treble(Black)	22	SMX765	Insulation Plate	N6	⊗ XSN3+6S	⊕3×6
4	SBC549-7	Button,Aux	23	SMX763	Insulation Plate	N7	⊗ XTB3+8BFN	Tapping,⊕3×8
5	SBC547-4	Button,Tuner	24	SBC337-1M	Button,Power Switch	N8	○ SNE2095-2	Tapping(Silver)
6	SBC551-4	Button,Phono	25	SJJ71B	Jack,Headpone	N8	⊗ SNE2095-3	Tapping(Black)
7	○ SBD71	Knob,Volume(Silver)	26	○ SKCA410M	Cabinet(Silver)	N9	○ XTB3+8BFN	Tapping,⊕3×8 (Silver)
7	⊗ SBD71-1	Knob,Volume(Black)	26	⊗ SKCA410KE	Cabinet(Black)	N9	⊗ XTB3+8BFZ	Tapping,⊕3×8 (Black)
8	SHR9653	Spacer,Knob(Volume)	27	SJF4815-2	Terminal Board	WASHERS		
9	○ SGXA410E	Front Sub Panel,Ass'y (Silver)	28	SMC1041-1	Bracket,P.C.B	N10	⊗ XWG3	Plain, φ 3
9	⊗ SGXA410KE	Front Sub Panel,Ass'y (Black)	29	SHR127	Bushing,AC Cord	N11	⊗ XWA3B	Spring, φ 3
10	SUS257	Spring,Button	30	△ SJA138-3	AC Cord	ACCESSORIES		
11	SBC565-1M	Button,Switch	31	SJFA3101-1	Terminal Board	A1	SSA611-1	Loop Antenna
12	SUB139-1	Connection Rod	32	SJB3005-1	Battery Case	A2	SMA231	Holder,Loop Antenna
13	SHG6323	Rubber,Connection Rod	33	SJC7	Terminal,Battery	A3	SMA233-1	Holder,Loop Antenna
14	SUW1967	Bracket,P.C.B	34	SJC9	Terminal,Battery	A4	XTN3+10AFZ	Screw,Loop Antenna Holder
15	○ SGX7475	Ornament(Silver)	25	SGK1569-1	Label	A5	SSA267-1	FM Indoor Antenna
15	⊗ SGX7475-1	Ornament(Black)	36	SQX4779	Label	A6	SQF11559	Instruction Book
16	SBZ663-1	Connection Rod	37(EX)	SGP3510-7A	Rear Panel	PACKING PARTS		
			37(EH)	SGP3510-7B	Rear Panel	P1	○ SPP699	Polyethylene Bag (Silver)
			38	SJF8037-1N	Terminal Board	P1	⊗ SPP649	Polyethylene Bag (Black)
			39	SKUA410E	Bottom Board	P2	SPS3519	Pad,Left Side
			39-1	[SKL245-2	Foot	P3	SPS3521-2	Pad,Right Side
			40	SDR37	Pulley	P4	SPS3523	Pad,Upper
			41	SHR9641	Holder	P5	○ SPG4335	Carton Box(Silver Type)
			42	SMP337	Holder	P5	⊗ SPG4339	Carton Box(Black Type)
			43	SDUA410M	Film,Volume			
			44	SJT347	Holder,Fuse			
			45	SHR401-1	Lock Pin			

Areas

* [EX] is available in Switzerland and Scandinavia.

Replacement parts list of Electrical parts : Refer to page 11.

EXPLODED VIEWS



EXPLODED VIEWS

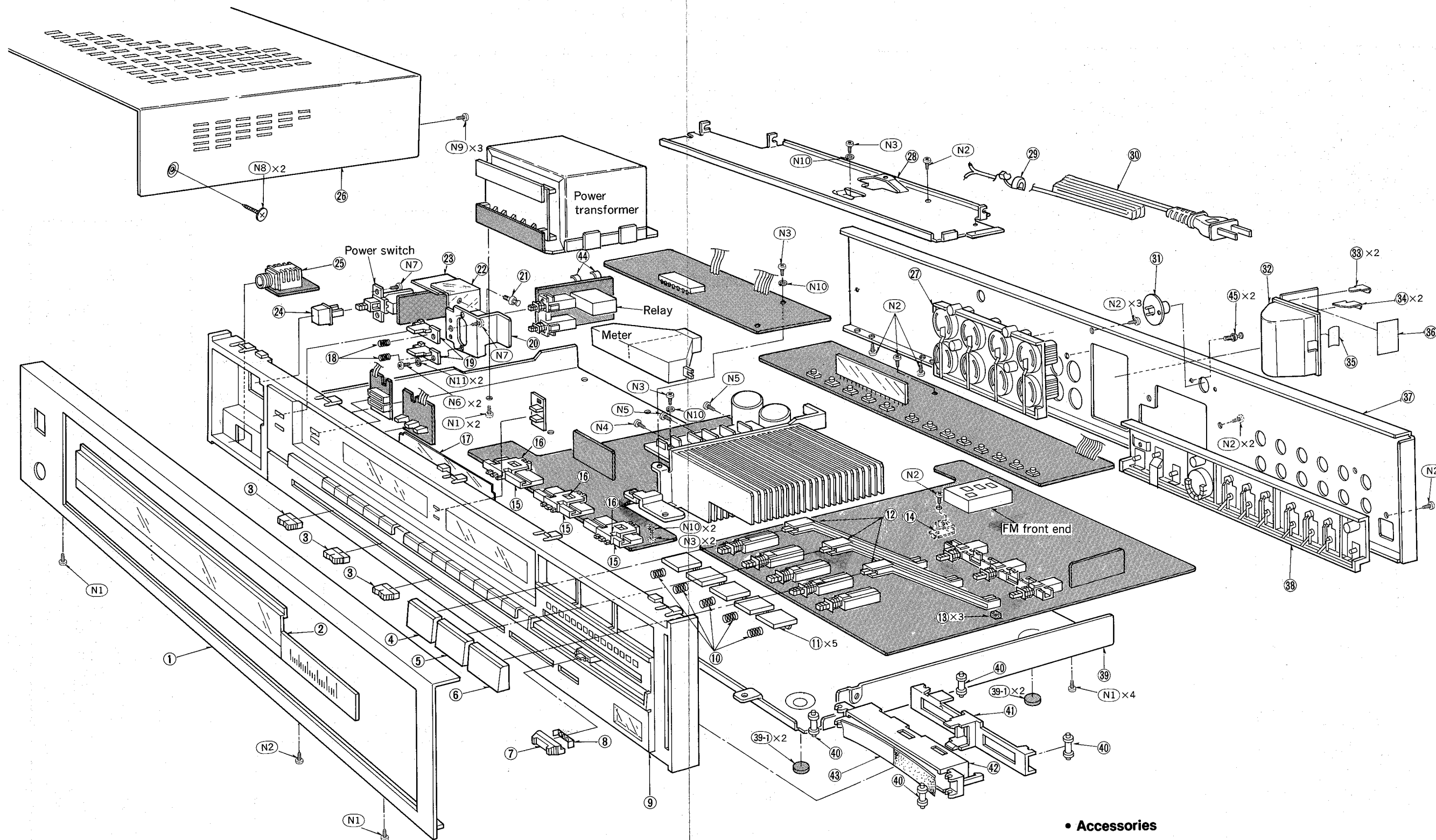
s specify the area.
of description stand

while O-marked

ed for both black

(K)

Description	
apping with Detent, $\phi 3 \times 8$	(8)
apping with Detent, $\phi 3 \times 8$	(13)
apping, $\phi 3 \times 8$	(7)
apping, $\phi 3 \times 8$	(1)
apping, $\phi 3 \times 14$	(2)
apping, $\phi 3 \times 6$	(3)
apping, $\phi 3 \times 8$	(2)
apping(Silver)	(2)
apping(Black)	(2)
apping, $\phi 3 \times 8$	(3)
apping, $\phi 3 \times 8$	(3)
apping, $\phi 3 \times 8$	(3)
Plain, $\phi 3$	(7)
Spring, $\phi 3$	(3)
Loop Antenna	(1)
Holder, Loop Antenna	(1)
Holder, Loop Antenna	(1)
Screw, Loop Antenna	(2)
Holder	(1)
FM Indoor Antenna	(1)
Instruction Book	(1)
Polyethylene Bag (Silver)	(1)
Polyethylene Bag (Black)	(1)
Pad, Left Side	(1)
Pad, Right Side	(1)
Pad, Upper	(1)
Carton Box(Silver Type)	(1)
Carton Box(Black Type)	(1)



Accessories

